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Southern Medical Association, Twenty-Ninth Annual Meeting, St. Louis, Missouri, November 19-22

TABLE OF CONTENTS

The Surgical Relief of Pain About the Head and Face. W. T. Coughlin, St. Louis, Missouri 395

Fractures of the Patella. Willis C. Campbell, Memphis, Tennessee 401

Discussed by Melvin S. Henderson, Rochester, Minn.; J. E. M. Thomson, Lincoln, Neb.; Robert Carothers, Cincinnati, Ohio.

The Repair of Surface Defects, From Burns and Other Causes, With Thick Split Skin Grafts. James Barrett Brown, Vilray Papin Blair, and Louis T. Byars, St. Louis, Missouri 408

Suppuration of Dermoid Cyst of the Ovary Following Labor. Charles R. Robins, Richmond, Virginia 415

Discussed by Wm. T. Black, Memphis, Tenn.

The Use of Bronchoscopy in Pulmonary Diseases. Edward A. Looper, Baltimore, Maryland 419

Tularemia: Fatal Case of the Typhoid Form Caused by Ingestion of Rabbit: Autopsy Report. Harvey G. Beck and Walter C. Merkel, Baltimore, Maryland 422

Chronic Ulcerative Colitis. Henry Gordon Rudner, Memphis, Tennessee 429

Discussed by T. T. Mackie, New York, N. Y.; Lee Rice, San Antonio, Tex.

Autonomic Instability: Is It an Entity. J. Shirley Sweeney, Dallas, Texas 434

Concluded on Next Page

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TABLE OF CONTENTS—Continued

Further Observations on Juvenile Diabetics and Hyperinsulinism. Arthur A. Herold, Shreveport, Louisiana 438
Discussed by David Greer, Houston, Tex.

When is Insulin Dangerous. Herbert Hill, San Antonio, Texas 441

Contact Dermatitis. A Preliminary Investigation. M. F. Engman, Jr., Morris Moore, and Roy L. Kile, St. Louis, Missouri 442
Discussed by Morris Moore, St. Louis, Mo.; M. T. Van Studdiford, New Orleans, La.

Carotenemia and Carotenoderma. D. Truett Gandy, Houston, Texas 444

Some Points in Early Diagnosis of Gastro-Intestinal Cancer. Edward Jelks, Jacksonville, Florida 446

Congenital Hypertrophic Pyloric Stenosis. B. C. Garrett, Shreveport, Louisiana 450

The Effect of the Ketogenic Diet on Infections of the Urinary Tract. Anson L. Clark, Hiram D. Moor and Donald G. Harrel, Oklahoma City, Oklahoma 453
Discussed by R. S. Mallard, Fort Worth, Tex.; Miley B. Wesson, San Francisco, Calif.

X-Ray Diagnosis of Polyps, Cysts and Tumors of the Nasal Sinuses. Claude Moore, Washington, District of Columbia 456
Discussed by J. A. Beals, Greenville, Miss.; John T. Crebbin, Shreveport, La.; J. Cash King, Memphis, Tenn.

Diagnosis and Treatment of Sinusitis. W. Likely Simpson, Memphis, Tennessee 458

Secondary Glaucoma. Edwin W. Burton, University, Virginia 461
Discussed by Speight Jenkins, Dallas, Tex.

Theelin in the Treatment of Gonococcus Vaginitis in Children. Boyd Reading, Galveston, Texas 464

Nutritional Work Among Under-Nourished School Children. Elmer L. Timmons, Colorado Springs, Colorado 466

Infantile Physio-Pathology. Eusebio Guajardo, Monterrey, Mexico 467

A Treatment for Neuropsychiatric Syndromes Employing "Twilight Narcosis." A. L. Skoog, Kansas City, Missouri 468
Discussed by Arthur J. Schwenkenberg, Dallas, Tex.

The Pellagra Problem in the South. Charles D. Reece, Austin, Texas 473
Discussed by M. D. Levy, Houston, Tex.

Hospital Teaching. R. Q. Goodwin, Oklahoma City, Oklahoma 478
Discussed by Harry C. Schmeisser, Memphis, Tenn.

Auxiliary Sterilizer. A. L. Atwood, Birmingham, Alabama 481

EDITORIALS 482
Diabetes and Arteriosclerosis
Experimental Leukemia and Malignant Myeloma
Gleanings from Recent Journals
Twenty-Five Years Ago

BOOK REVIEWS 485

SOUTHERN MEDICAL NEWS 487

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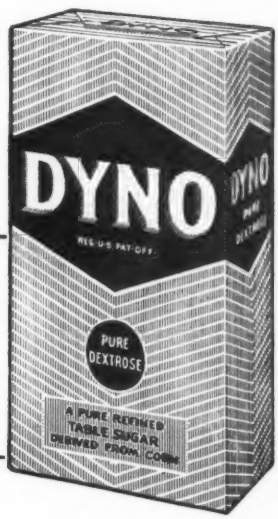

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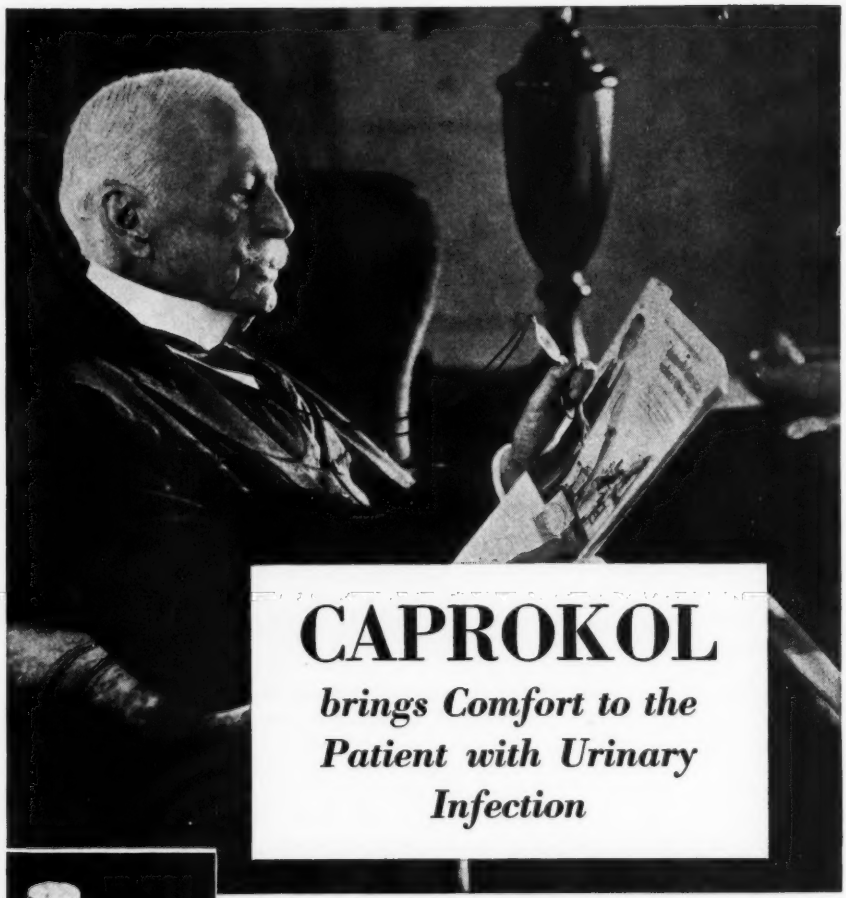

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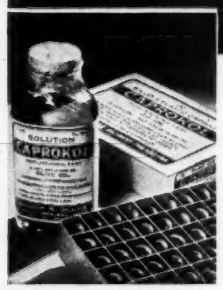

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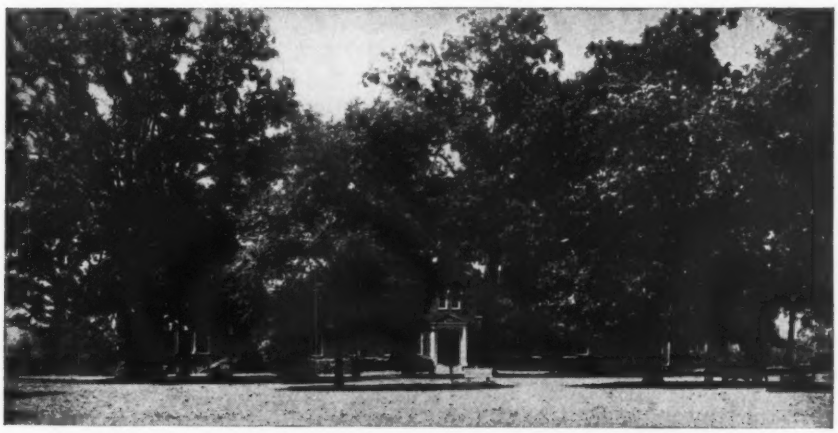

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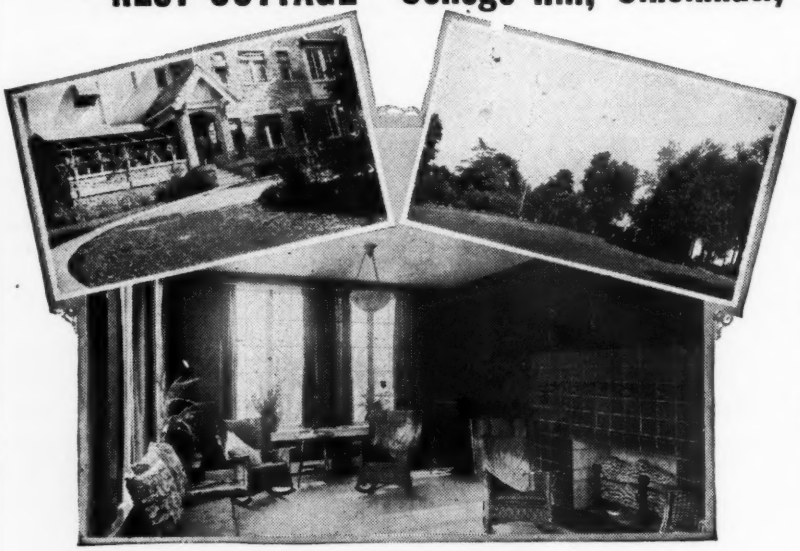

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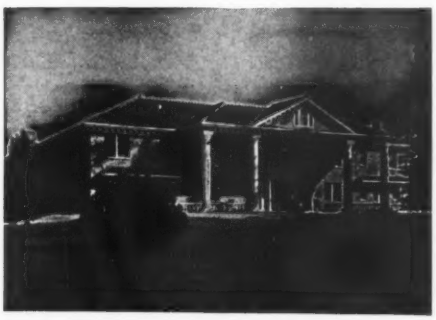

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THE SURGICAL RELIEF OF PAIN ABOUT THE HEAD AND FACE*

By W. T. COUGHLIN, M.D.,†
St. Louis, Missouri

In a discussion of this subject, it is necessary to consider the kinds of pain calling for surgical treatment, their causes and their method of cure. No reference will be made to ordinary headache nor to that *bete noire* of the physician, migraine. The surgeon plays as yet no role in their relief. I shall refer entirely to persistent or chronic pain of a severe nature, and to that variety which is fairly well localized or restricted to one locality.

Pain of a chronic nature, limiting itself to a certain locality, is due to demonstrable pathologic processes or it is not. If a pathologic lesion be the exciting cause, the lesion is either contiguous to or remote from the painful locus. If neither immediate nor remote anatomic lesion can be discovered, then the pain falls into the group of idiopathic neuralgias: painful conditions characterized clinically by the occurrence of attacks of pain, unaccompanied by fever or other sign of inflammation and the cause of which remains so far unknown. Those that are not neuralgic can be classified as being either inflammatory or neoplastic in origin.

I should like to make this statement, the truth of which I have demonstrated to colleagues at the operating table many times, namely: that the dura mater is sensitive, more so on its inner surface, but also on its outer surface and more especially sensitive along the course of the meningeal arteries and the venus sinuses; and, furthermore, that irritation of it, sufficient to produce pain, may be very slight. This, one has an excellent opportunity to demonstrate while operating upon a patient under local anesthesia. I have also demonstrated that the pain produced by such an irritation is most frequently felt by the patient at some point distant or remote, the anatomical connection between the two points being very difficult, if not impossible, to explain. I have repeatedly observed that separation of the sinus transversus from the bone has caused the patient agony in the forehead or eyebrow, sometimes on the same side, sometimes on the opposite.

Since I have mentioned the eyebrow, we shall begin with discussion of pains of inflammatory nature which localize themselves here. Most frequent among all are those due to infections in the sinuses, particularly in the frontal sinus, and, spreading from here, subperiosteal infections inside the orbit. These may exist for some time, producing severe pain before the pus under the periosteum has broken into the orbit to produce orbital cellulitis or swelling of the lid, or bulging of the globe. It can also exist without fever. When, however, infection has spread into the orbit, temperature and exophthalmos will be expected. In either case, a leukocyte count is of value. Chronic suppurative frontal sinusitis should not be hard to diagnose. The pain often resembles headache, but can be very severe; more so on the affected side. Sometimes tenderness exists along the course of the supraorbital nerve. Ewing called attention to a tender spot where the pulley of the superior oblique is attached. The x-ray shows a haziness, and transillumination is lessened. Suppuration within the frontal sinus is not properly relieved by treatment applied through the nose. Untreated frontal sinusitis often results in osteomyelitis of the skull, and this is one of the most dangerous complications that can arise, leading as it does to meningitis or brain abscess (*Fig. 1*). Any patient who has a chronic suppurating frontal sinusitis should have free opening and drainage of a surgical nature; no nice, little,

*Read in General Clinical Session, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

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Fig. 1
An intradural abscess which had its origin in a frontal sinusitis. A periostitis of the frontal bone accompanied it. Bismuth has been injected. Pain in his forehead developed after an infection of pink-eye and was diagnosed neuralgia.

modest medical incision should be tolerated. The fear of deformity is the foe of good surgery. Much better have a living patient with a deformity (which a later plastic operation can always cure) than a dead patient with a beautifully regular contour of all his features, "looking so natural."

Osteomyelitis of the skull also occurs in those who are suffering from tertiary syphilis, by preference in the frontal region. It most often follows after a gummatous periostitis. The suffering of the patient may be very great and for some time no swelling is evident, neither is there fever nor leukocytosis. The pathologic process consists of a deposit of round cells in and underneath the periosteum. The periosteum is tightly applied to the bone and extremely well supplied with sensory innervation. For this reason the disease is likely to be painful. Not only one, but myriads of these small lesions are present, and as the older grow and soften, younger ones appear and increase in number. The outer table lying underneath is absorbed and the diploe is exposed. When swelling appears, the pain suddenly disappears because the periosteum has broken through and relieved the tension. There is hardly any way in which diagnosis can be made positive except by antiluetic medication, and if large doses of potassium iodide or three full doses of arsphenamine do not relieve the pain, it is probably not gummatous periostitis. The x-ray evidence is unreliable during the first three weeks. When these lesions become secondarily infected with pyogenic organisms the condition is likely to last for a very long time. As long as the gummata remain free from pyogenic infection the condition is not difficult to cure. Active antiluetic treatment should be instituted. If the relief is not prompt, aseptic opening and removal of the subperiosteal exudate should be done and the administration of antiluetics pushed (*Fig. 2*).

Again there is pain above the eyebrow in inflammation of the deeper sinuses, ethmoidal and sphenoidal, and even when the pathologic condition appears in the antrum we have found the patient with pain in the eyebrow. This is referred or reflected pain. I have never yet seen such pain when due to an inflammatory process without at the same time finding a tenderness, especially tenderness to light touch over the area in which the pain was complained of.

Fig. 3 shows a patient whose first complaint was severe pain in the face below the eye and about the cheek bone. He was a boy of about 16. The story was that there had been very considerable pain, unaccompanied by fever, before any other signs could be demonstrated. X-ray examination was negative and so was the Wassermann test; but later he developed a swelling below the eye as the figure shows. When seen by me it had been pronounced sarcoma. No matter who makes it, when a diagnosis of sarcoma has been made, it has always been, still is, and will continue to be our practice to give antiluetic medication whether the Wassermann is positive or not. This is a case in point. This boy's tumor promptly disappeared under arsphenamine and he has been well now about five years with no recurrence.

Fig. 4 shows a picture of diffuse osteitis of unknown origin. The patient was a woman of 30 years. The diagnosis of trigeminal neuralgia, tic douloureux, had been made and root section performed elsewhere without relief. She still complained of very severe pain in

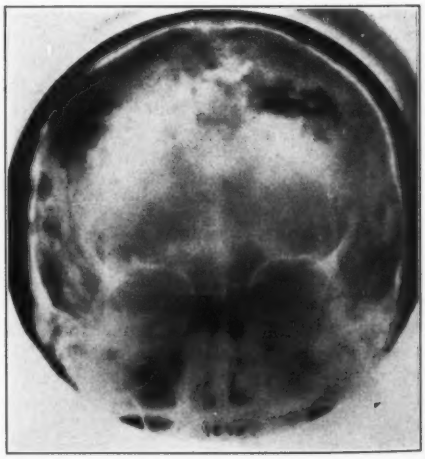

Fig. 2
Luetic osteomyelitis of the frontal bone. Long treated as migraine.

Fig. 3

Tumor formation in the right side of the face of a boy sixteen years old. For months before the swelling appeared, the patient was treated for neuralgia. It disappeared entirely under antiluetics.

the whole side of her head, constant pain, which the pain of tic douloureux never is, keeping her awake at night, like the pain of a new growth. There were remissions and exacerbations. The x-ray showed general thickening of the orbital margin, the malar bone, the zygomatic arch and the ascending ramus of the mandible, also a shadowy antrum. The thickening was evident on palpation. The overlying soft tissues were thickened. The overlying skin had an erysipeloid look. She had a complete anesthesia to pin prick in the field of the fifth; the operation of root section had been well done, but her pain was unrelieved. The Wassermann and Kahn were negative. Her antrum had already been operated upon, but it was again opened widely. It was found to be filled, almost obliterated, by fibrous tissue. Her pain was still unrelieved, but it has yielded to potassium iodide and mercury with also Coley's fluid. The actual cause of the condition has not been discovered, but leontiasis ossea has been considered.

Localized pain due to the growth of neoplasm is frequently seen, but neoplasm, either cranial or intracranial, may attain very considerable dimensions without causing any localized pain whatever, although it is very usual for all of them to cause the patients to have headaches. In the frontal region, tumor of the bone, of the dura or tumor within the brain itself, may cause the patient untold suffering. Here, just as in pain of an inflammatory nature, it is most essential to have an x-ray examination. The following case is an illustration.

A girl 18 years of age, who had always been in good health, began 6 months ago to have great pain in the right frontal region. It was more or less constant, but there were exacerbations during which she screamed with agony and narcotics had to be administered. She was sent to me as a case of trigeminal neuralgia. For the previous 2 months she had been blind in the right eye. Failing vision had begun almost at the onset of pain. The ophthalmoscope showed atrophy of the right optic nerve with some haziness of the disc in the left eye. There was an upgoing toe on the left side. There were port-wine birth marks on the right cheek and right side of the neck. The x-ray showed very great thinning in the right frontal region (*Fig. 5*). A diagnosis of intracranial hemangioma was made and operation revealed a tumor composed of a congeries of dilated arteries and veins. So great was the mass that a large portion of the temporal and frontal lobes was entirely replaced by it. The mass was at its thickest, apparently, about the region of the Sylvian cistern. Many and various of these vessels were ligated with silk. But this did not seem to make any visible difference. At a later date the common carotid was ligated together with the external carotid above the superior thyroid. Again the skull was opened and ten monel metal needles each containing 12.5 milligrams of radium were laid on the lateral and inferior surfaces of the growth and left for nine hours. All of her pain has disappeared and she is quite well although, of course, she is still blind in the right eye.

We shall now turn our attention to the opposite pole and consider pain of an inflammatory origin felt in the back of the head. The most obvious, of course, is pain due to mastoiditis. This usually soon involves the whole side of the head. As a rule the diagnosis is not long in doubt and the rhinologist gives prompt relief by an operation on the mastoid cells.

Fig. 4

Disease of the antrum accompanied by overgrowth of the near-by bones. Compare the ascending rami, the zygomas and the malars. The antrum was almost filled with hard, fibrous tissue. The overlying skin had an erysipeloid look. Root section had been performed for trigeminal neuralgia. The patient was given Coley's fluid and antiluetics, and has recovered.

Fig. 5

The patient's chief complaint was intractable, constant pain with paroxysms of extreme intensity in the region of the upper division of the fifth. A diagnosis of trigeminal neuralgia was made. Note the great absorption of the frontal bone. An enormous hemangioma was found replacing a large portion of the frontal and temporal lobes. The pain has been entirely relieved by radium and multiple ligations.

There is an inflammatory lesion seldom diagnosed early which consists in an infection or an inflammation of the tissue between the transverse process of the axis and the base of the skull. On the anterior aspect of the process, and above it, is situated a lymph node which receives lymph from the upper reaches of the nose and nasopharynx, as well as from the middle ear, maxillary antrum, mastoid antrum and mastoid cells. Here infection becomes lodged and, if conditions are favorable, adenitis and abscess may follow. The pain is severe over the head, behind, above and medial to the mastoid. The condition soon causes interference with the function of the cervical spine, and a certain rigidity of the neck supervenes. There is no external swelling nor swelling in the pharynx until later. One would expect such an abscess to cause bulging in the pharyngeal wall; it does not do so at first, or it passes unnoticed and the first swelling may appear externally. The pain is intense over the whole half of the head, particularly bad posteriorly. There are two points of tenderness on deep pressure: one is behind the mastoid process where pressure forward and inward causes decided wincing and the other is just below the ear where deep pressure inward reveals tenderness. There is neither edema nor swelling until late. This condition, even if unaccompanied by fever, should not be allowed to drag on. It is safe and very simple to make an incision along the anterior aspect of the process below the ear. To delay will lead to infection of the intervertebral joints and perhaps to spread of the infection to the other side, which it can easily do in the angle between the base of the skull and the spine in front. This will be above the line of visibility in the ordinary throat examination and seems to be a spot that is unusually hard to visualize by any means. In patients under 21, such pain appearing sometime after an injury, especially after a slight injury, should force the physician to exclude osteomyelitis of the spine at this level (*Fig. 6*).

Now when any inflammatory lesion of an acute nature causes inflammation of the dura on its outer surface by contiguity, the inner layer of the dura also becomes inflamed and a spinal puncture may reveal a turbid fluid, but even if clear, always a fluid with a higher cell count than normal. This may lead to the diagnosis of meningitis; however, the high intrathecal tension in the latter condition should be a strong point in differentiation.

Fig. 6

Total obliteration of the joints between skull and atlas and between atlas and axis following long-continued and severe occipital neuralgia accompanied by slight fever and leukocytosis. Pus was evacuated and the patient recovered.

Fig. 7

An antrum in which foreign body had eluded detection through many x-rays. The only complaint was very intense pain medial to the posterior border of the mastoid on the same side. The patient was immediately relieved by the removal of the foreign body with drainage of the antrum.

A referred pain in the occipital and suboccipital region, due to inflammatory disease at a distance, is common. The pain can be most excruciating, constant or periodic, continuous or spasmodic. Disease of the sphenoidal sinus or of the maxillary antrum is sometimes accompanied by such a pain. *Fig. 7* shows the picture of a physician in whose antrum a foreign body eluded the x-ray during many examinations. When at last it was located and removed, the relief of the postmastoidal pain was immediate and permanent. It proved to be some plaster of Paris that had been forced up into his antrum while his impression was being taken for a temporary plate soon after extraction. Plaster is permeable to the x-ray. It is also well-known that sphenoidal sinus disease is often accompanied by pain behind the mastoid process. And again a very severe pain in the occipital region is common in disease of the upper vertebrae, metastatic carcinoma or tuberculosis in particular.

It is generally considered significant when a patient with the other signs of tumor in the cerebellar fossa indicates the more painful side. It is usual to find the pathologic process on that side. Pain and stiffness in the back of the neck and head are very frequent concomitants of tumor below the tentorium.

Referring to pain of a neuralgic nature, one must first describe it. It is found almost solely in the fields of the fifth and ninth. I think the great distinguishing mark between pain of a neuralgic nature and that due to some organic pathologic condition consists in this, that the neuralgic pain, at first at least, does not interfere with the patient's sleep. It disappears as soon as he lies down and becomes quiet. He goes to sleep and it recurs when he awakes. This is true especially in the early months. The pain of neuralgia is far more likely to occur in periodic attacks, varying in duration from a few days to a few weeks, and during the attack the pain is usually not constant, but occurs in paroxysms or spasms. These paroxysms last from a few seconds to perhaps a minute, maybe longer, and the interval between them is very variable, often a few minutes and sometimes several hours. In the free interval the patient lives in constant dread and expectation of the return of the pain. Certain movements, even slight, are sufficient to precipitate the spasm. The patient soon learns just what these movements are and seeks to avoid them. Touching the part in any way, rubbing, washing, chewing, eating, swallowing, even allowing a draft of air to strike him, any or all of these may be sufficient to provoke a spasm, but the skin is usually not sensitive. The patient with true neuralgia does not talk very much about it for fear of causing an attack. The patient with pseudoneuralgia is often quite garrulous. Gradually the periods of relief become shorter and the duration of the attack becomes longer. The spasms increase in severity and presently neither night nor day is the patient free from this recurring paroxysm of pain. Now, in true neuralgia (tic douloureux) the patient can usually indicate with one finger the point at which the pain begins. I think if he cannot do this the trouble is probably not true tic douloureux of the fifth or ninth nerve. The one point at which it begins, he soon learns to know. Frequently, touching this point in any way will excite a spasm. It is not often that one can excite a spasm by touching some unaffected branch of the nerve involved.

The pain of trigeminal neuralgia major, true tic, I believe, is hardly ever found outside the

field of the fifth. The pain in ninth nerve neuralgia is found below this, namely: in front of the tragus and a little above it; inside the ear; in the anterior wall of the canal and in the pinna or below the angle of the jaw, deep in the neck; above and also behind the greater cornu of the hyoid bone; in the back of the tongue; in the tonsil or its fossa and in the lateral and posterior part of the pharynx. The paroxysmal character and recurrent attacks in these two neuralgias are similar. The location of the pain is about the only difference I can see. Either one is permanently cured by section of the corresponding root inside the skull. It was first done by Frazier for fifth nerve neuralgia and by Adson for that of the ninth nerve. A constant ache in the field of the fifth occurring without any demonstrable pathology I have never seen relieved by root section of the fifth nerve, but when sensory root section is done for the relief of pain of an inoperable cancer in the field of the fifth or ninth or elsewhere throughout the body, the relief is most gratifying.

With regard to the treatment, if one be certain that he is dealing with a true neuralgia, he may speak definitely to the patient concerning the results of treatment. Up to the present time there are only two forms of treatment that have thoroughly demonstrated their right to survival, namely: (a) intracranial section of the sensory root or a part of it for major neuralgia of the fifth nerve, and intracranial section of the glossopharyngeal or ninth nerve for major neuralgia of that; (b) the deep injection of alcohol for neuralgia of the second and third divisions of the fifth, and for these only. The first, root section, effects a permanent cure. If it does not, either the operation has not been properly performed or else the condition was not true neuralgia of the major or tic douloureux type. The operation is standardized and is easy of performance and at the hands of those who are competent it is safer than almost any other major operation, bar none. The deep injection of alcohol in which a small amount of alcohol is injected into the nerve where it leaves the skull will effectively stop neuralgia of the same type for a variable length of time. The average duration of relief in injection of the second and third divisions of the fifth is about a year. With each succeeding injection the period of relief is less until after about three or four, relief can no longer be expected in this way. In some, the relief has been permanent (in my experience, 25 years). Either method, if successful, will lead to loss of sensation in the field supplied by the branch injected. In the case of section, this is permanent, but after alcohol injection it is usually transitory and when sensation returns neuralgia usually recurs. I do not recommend injection of the Gasserian ganglion with alcohol nor do I recommend injection of the ninth nerve, but there are cases in which injection of the ganglion is the best method of treating trigeminal neuralgia major: for example, in the very aged, or those with great debility or inordinately high blood pressure or those with very marked arterial degeneration and in whom the upper division is involved. For such, the injection of the ganglion itself will probably give permanent cure. In my experience, conjunctivitis, corneal ulcer and loss of the eye are more common sequelae after this than those that follow all the other procedures put together.

The minor neuralgias frequently have some discoverable cause. The pain of these is seldom so great. These patients also have the freedom

Fig. 8

An impacted third molar, the removal of which seems to have cured a case of neuralgia.

from pain on going to rest. Their causes vary much. The unerupted third molar is perhaps the most common cause for minor neuralgias in the field of the fifth (*Fig. 8*). The tooth may be buried in the bone and growing in the wrong directions. Sometimes it is upside down, or almost so, and then the growth may impinge against the branch or branches of the inferior dental nerve, or it may be pressing against the root of the second molar and produce disturbance in the same way. Its absence from its normal location on mouth examination, its presence detected by the x-ray, should indicate immediate extraction for relief.

Osteomyelitis of either jaw can cause a lot of suffering before it is discovered, but if the roentgenologist is competent he can detect it very early (*Fig. 9*).

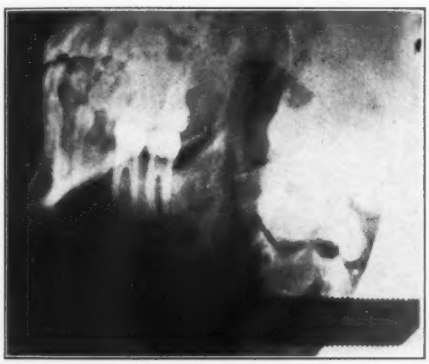

Fig. 9
An osteomyelitis of the jaw unaccompanied by swelling. Diagnosed neuralgia and unrelieved by tooth extraction. Immediately relieved by the removal of dead bone and loosened teeth and packing wide open.

A scar anywhere in the field supplied by the nerve may be the cause. But I would be very loath to say so if manipulation of the scar caused no pain or demonstrated no tenderness. In the absence of any other discoverable cause, such a scar should be removed.

And now last but not least, a neoplasm may cause a severe neuralgia. I shall never forget a case of neuralgia of the third division of the fifth, diagnosed as trigeminal neuralgia major by several of us and treated as neuralgia by injection and found later to be associated with carcinoma between tongue and tonsil.

FRACTURES OF THE PATELLA*

By WILLIS C. CAMPBELL, M.D.,
Memphis, Tennessee

During the past twenty-four years my associates and I have treated fractures of the patella by various methods in 127 cases. It was thought that a survey of the end results would be of practical interest. Of this number there were 90 males, 37 females; 119 were adults, 2 were children aged 10 and 11, and one an adolescent aged 14. Five others were between the ages of 14 and 20.

Fractures of the patella rarely occur under the age of 16 years, and are more frequent between the ages of 25 and 45, the average age being 38. In the aged the same force that causes fractures of the patella will more frequently produce a rupture of the quadriceps tendon. Our oldest fracture of the patella was 71 years. The rarity of fracture of the patella in children is possibly due to the difference in the osseous structure of the bone in childhood, as children more frequently injure the knee by falls than adults.

The fractures may be classified for discussion as follows: (1) incomplete transverse, (2) complete transverse, (3) incomplete longitudinal, (4) complete longitudinal, (5) compound, (6) ununited.

Incomplete transverse fractures and incomplete longitudinal fractures are simple problems, requiring only a short period of immobilization, followed by gradual restoration of active motion. The end results, unless complicated by injury to the interior of the joint, should be excellent in all cases.

Longitudinal fractures, according to Lapidus, are more common than is generally recognized. Complete longitudinal fractures with separation of the fragments are less common than the incomplete variety. I have seen only one case, which occurred in a young boy aged 10 years, who was at the time of injury under treatment for progressive polyarticular arthritis. He was standing on the front end of a street car which collided with an automobile, throwing the boy upon his right knee. Examination revealed a wide longitudinal separation through the center

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

Fig. 1
Transverse fracture of the patella and transverse incision.

of the patella, with about one inch separation of fragments, just as if a split patella incision had been made, though there was no injury to the skin. Reduction was easily made by lateral pressure, with the aid of towel clips, which were immediately removed and a cast applied. Recovery was uneventful.

There were 74 complete transverse fractures, 64 were fresh, 10 were ununited. These fractures may be due either to direct or indirect violence, and are a more complex problem than the other types, as the contracture of the quadriceps causes a wide separation which makes approximation by manual reduction impossible. Of 51 in which x-rays were available the line of fracture was in the upper third in 2, middle third in 30, and lower third in 19. The line of fracture in all was more or less serrated and in most instances oblique, from without inward and downward. The separation of the fragments depends upon the degree of contraction of the muscles comprising the quadriceps tendon. The upper fragment was also frequently turned forward, so that the fractured surface faced downward and forward; in other words, buckled forward.

The almost universal consensus of opinion is that this fracture should be treated by open operation, with some method of internal fixation. 74 cases, 64 fresh and 10 ununited, have required the open operation by the following methods:

(1) Drilling of fragments and suture with kangaroo tendon, 10 cases.

(2) Suture tendinous fibers and capsule with kangaroo tendon or chromic catgut, 18 cases.

(3) Drilling of fragments and suture with wire, 7 cases.

(4) Rustless steel wire loop about the entire patella, 9 cases.

(5) Anterior wire loop, 30 cases.

The first four methods are well-known and require no description. The last method was described by the late Denegre Martin,* of New Orleans, and consists of a curved transverse incision with convexity upward, exposing the area of fracture. A 0.5 mm. rustless steel wire is threaded upon a large Gallie fascia needle and passed through the quadriceps tendon just above and in close proximity to the upper extremity of the patella on the inner portion of the anterior aspect of the tendon, then downward over the anterior surface of the patella about

*Martin, E. Denegre: Results of Work Done on Fractures of Patella for Past Twenty-Six Years, with Conclusions. New Orleans Med. & Surg. Jour., **84**:846, 1931.

Fig. 2
Surface of the patella denuded.

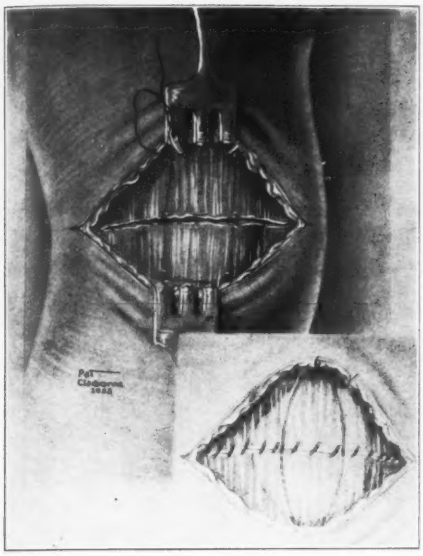

Fig. 3
Anterior wire-loop inserted.

junction of inner and outer two-thirds of both fragments of the patella, but beneath the tendinous fibers, until the patellar tendon is reached, when the needle with wire is placed transversely through the patellar tendon in close proximity to the lower extremity and then upward over the anterolateral aspect of the anterior surface of the patella until the quadriceps tendon is reached. Both ends are then drawn tight, usually, accurately approximating the fragments. The wires are then twisted together, severed, and depressed into the quadriceps tendon. The forward tilting of the upper fragments is thus corrected and the fragments are forced into line. The sutures must be placed close to the patella above and below, for it has been found that if they are placed at any distance in the tendon either above or below, perfect fixation is lost as the wires may cut the tendon when under tension and permit separation of the fragments. The wire loop is usually placed slightly oblique as the fracture line is often downward and inward. A roentgenogram is then made, which should demonstrate perfect approximation, and in some instances the fracture may be recognized with great difficulty. If the lateral or medial portion of the joint capsule is excessively lacerated, a transverse skin incision should be made and these structures sutured with catgut, otherwise a curved longitudinal incision gives success, and is sufficient. The procedure is superficial; a simple pursestring suture over the anterior aspect, with minimum trauma, gives efficient fixation in recent fractures and permits early mobilization. In closed fractures the procedure may be employed immediately unless there is extensive trauma of the skin and soft parts. The method is also adaptable to compound fractures as efficient drainage and active motion is permitted.

After the elapse of ten days, or when the wound has healed, active motion is instituted, but gradually increased until at the end of sixty days there should be complete voluntary extension and flexion to 90 degrees, and in some instances practically normal motion. Much depends on the age of the patient and incident complications as internal injuries to the joint and adjacent fractures. Function can be secured more rapidly, but at the expense of some anatomical irregularity which may later cause osteo-arthritic changes. There is no method of internal fixation that can act as a complete substitute for nature, therefore, I advocate a more gradual increase in flexion.

The same principle is applied in the treatment of fractures of the olecranon. The wire is placed

Fig. 4
Lateral view after insertion of anterior wire-loop.

Fig. 5
Transverse fracture of the patella.

through the triceps tendon or aponeurosis just above and close to the olecranon. Below, the wire is passed through a drill hole in the ulna. Excellent approximation is secured as the wires are made tense and anchored in the triceps muscle. Active motion may be instituted early.

In complete fractures of the patella, satisfactory results may be obtained by any method of internal fixation, and has been secured in a high percentage from all of the methods which we have employed. I have not used fascia lata or tendon plastic procedures, so cannot discuss the feasibility of such measures, but do not believe that as efficient fixation can be secured as with rustless steel wire. I do, however, agree that foreign material should not be employed where the same result can be accomplished otherwise.

We have reviewed the history of all of the cases treated by the first four methods, as to functional end results, and anatomical approximation as demonstrated by the roentgenogram. An accurate estimate cannot always be made of all cases, as many did not return for further observation, but we do know that in those in which complete fixation was employed for a period of six weeks, which was the custom ten or more years ago, that a much longer period of disability was required, and that more cases did not have a return of normal function. However, no uncomplicated case can be recalled in which eventually 90 degrees of flexion was not finally secured and in a high percentage normal motion. The frequent occurrence of non-union, but with good function, has been reported, after internal fixation, but this has not been our experience. In only two cases in which we have treated has there been a failure of union, and those, we believe, are due to unusual complications or errors in technic.

The anatomical end result, as demonstrated by the roentgenogram, could be determined in 43 cases, is illustrated by the following table:

ANATOMICAL END RESULT

	Perfect	Very Slight Irregularity	Slight Irregularity	Irregular
Drilling of fragments and suture with kangaroo	2		1	4
Suture of tendinous fibers and capsule with kangaroo tendon or chromic	1		3	6
Drilling of fragments and suture with wire			3	
Rustless steel wire loop about entire patella	2		2	
Anterior wire loop	8	4	1	6

"Perfect" indicates that the articular surface has been restored to normal; "very slight irregularity" indicates that the approximation is almost satisfactory, but there is a slight unevenness of the articular surface; "slightly irregular" is more unevenness than the preceding; "irregular" indicates that there is gross permanent irregularity of the articular surface of varying degree.

In fractures in the vicinity of joints it is an undisputed fact that as complete anatomical restoration as possible is essential. The better the anatomical result the better the functional result. Perfect reduction was secured by all methods in some cases, but by far the larger percentage was obtained in those in which internal fixation was secured by wire, the anterior wire-loop giving the largest, and the circular (about the patella) the second.

Of those in which the anterior loop was employed in 12 the anatomical reduction was most satisfactory (8 perfect and 4 nearly perfect).

Fig. 6
Roentgenogram on operating table after reduction. Steel clips for the purpose of holding stockinette attached to the margin of the operative incision.

In those designated as irregular the approximation was much better than secured in the same class by other procedures. Some of our irregularities were caused by error in technic which consisted in the placing of the sutures in the tendon at some distance from the patella, and in being satisfied with approximations which had given excellent results in methods formerly employed. Both can largely be eliminated by readjustment when the roentgenogram shows the slightest irregularity, and further confirmation by the x-ray before the wound is closed. The x-ray should be available in all operations upon fractures, and bones, where there may be the slightest uncertainty of osseous relations. Roentgenograms can be secured within less than five minutes with the proper technic.

The disadvantage of the anterior wire-loop is that a foreign material is employed which may later require removal. This, however, is accomplished usually with ease under local anesthesia, and has been found necessary in five cases. Two of these were compound and three were severely contused. The advantage of the anterior wire-loop is that early function is permitted, better anatomical restoration, and decrease of time of disability.

In one case in which no motion at the knee was possible for a period of several months due to a fracture of the lower end of the femur in which union was delayed, motion was limited to 15 degrees, which should be increased materially with restoration of function, as there is no organic change in the joint. In one compound fracture in which there was an extensive loss in continuity no union occurred and a second plastic operation was necessary.

Compound fractures of the patella, unless very extensive, or obviously infected, may be treated by the anterior wire-loop in the same manner as fresh fractures. One case with extensive soft tissue trauma and bony comminution was treated satisfactorily by two towel clips grasping and approximating the upper and lower fragments. The clips were removed at the end of three weeks, after which convalescence was uneventful.

Fig. 7
Six months after operation.

Fig. 8
Transverse fracture of patella with extensive comminution.

Ununited fracture of the patella is an entirely different equation from fresh fractures, as there is always wide separation of the fragments which can only be approximated with difficulty. As this separation is due largely to contraction of the quadriceps tendon with the attached upper fragment, skeletal traction with Kirschner wire just above the patella may be indicated as a preliminary measure in the more resistant cases. Ten cases of ununited fracture of the patella have been operated upon. The method employed consists of an internal longitudinal incision with dissection of the upper fragment and quadriceps tendon for a short distance. Both fragments are denuded and approximated by grasping the patella or quadriceps tendon with two tenaculum skin or towel clips. An 0.8 mm. wire is then placed around the patella and twisted together above and depressed into the quadriceps tendon. Spongy bone and bone chips are then placed into the loose spaces and across the line of fracture, and the wound closed. In some instances a dense bone graft from the tibia may also be employed. The functional end results have been most satisfactory. Of the 10 cases six secured excellent function, one secured good bony union but limited motion, three could not be traced and the results are unknown. Of the seven cases, five secured bony union and two fibrous union, but of sufficient strength to secure good function. In one of those with fibrous union the anterior wire-loop was used, but it is not so efficient as in fresh fractures and should not be employed when there is non-union. Spongy or cavernous bone transplants are advocated for the osteogenetic power is greater than in any other graft. The author has employed this type of graft in over 400 operations for bone block about the ankle and hip. In not a single case has the graft failed to take and remains as active living bone, and in most instances it has increased in size according to local functional demands. I do not intend to infer that the operations were all mechanically successful, but the spongy bone grafts lived and proliferated in 100 per cent.

The after treatment in ununited fractures is

Fig. 9
Same after reduction.

Fig. 10
Ununited fracture of patella, six months' duration.

Fig. 11
Reduction by the use of heavy circular wire for fixation and bone graft for osteogenesis.

identical with that employed and described in fresh fractures. For successful function to be restored, early active and passive motion is essential, and mechanical fixation must be sufficient to permit such treatment.

Accurate comparison cannot be made of a method in the treatment of fractures of the patella in which immobilization was employed for a long period of time with one in which early motion was instituted. However, unless there is efficient internal fixation, which is not accomplished by absorbable sutures, there is danger of more or less separation if active motion is instituted. Active motion instituted early is essential to minimum disability.

As previously stated, a large percentage of open operations upon the patella have given excellent results, but from personal experience with all the methods above described, I am certain that the anterior wire-loop, as described by Denegre Martin, has secured and maintained the most accurate anatomical approximation and the best functional results with less chance of late arthritic changes than any other method. Therefore, it is worthy of consideration at this time.

DISCUSSION (*Abstract*)

Dr. Melvin S. Henderson, Rochester, Minn.—I agree with Dr. Campbell that immediate operation in recent fractures of the patella is advisable. We have used various methods of bringing the fragments of the fractured patella together, all satisfactory it would seem. When the fracture is transverse and there are two good sized fragments I have found it quite convenient to use beef-bone screws, either one or two. The electric drill is introduced after the fragments have been brought together and held by bone clamps. Then the drill hole is tapped and the beef-bone screw introduced. The soft structures about are then sutured with catgut. In the comminuted type the use of the wire as described by Dr. Campbell is without doubt the method of choice.

Some years ago I found that in certain cases of nonunion of the patella which had existed for a long time there was so much of a gap separating the fragments that it was impossible to bring the upper fragment down to the lower fragment, the quadriceps muscle be-

ing so retracted. In one such case with bilateral ununited fracture of the patella I side-stepped the problem, so to speak, by dissecting the upper fragment entirely free and moving it down and fastening it by aid of beef-bone screws to the lower fragment and then sewing the soft structures back around it. In the few cases of this kind that we have had, excellent results have ensued. When the lower fragment is very small it can be removed entirely and not be missed.

Dr. J. E. M. Thomson, Lincoln, Neb.—This paper embraces a wealth of experience in the treatment of fractures of the patella to which few clinics are privileged. The technic described by Dr. Campbell should be found acceptable in most instances. Considerable stress is laid, by all who speak or write upon this subject, upon the possibility of non-union and refracture. It has been my experience to find, in recent years, cases in which the fracture is due to direct violence, such as one that would occur during an automobile accident in which the patella is forced against the instrument panel or some forward object while the legs are in flexion on the thighs. Most of these fractures have been transverse fractures in which there is one large and one small fragment. It has been our custom in all such cases carefully to excise the small fragment, then with kangaroo tendon, fascia or strong chromic, through drill holes in the patella, to re-attach the tendon substance into the large remaining fragment. We have made a custom also to re-approximate the soft tissue edges and remove all frayed, torn substance. This procedure has been most satisfactory in every instance, and it takes away all possibility of non-union or re-fracture, in that instead of joining two bony fragments that have a very low osteoblastic generative quality, one changes the problem entirely to that merely of joining soft tissue to bone, which usually brings a satisfactory union and result. Also, it lessens the period of disability and allows early mobilization of the injured lower extremity.

Dr. Robert Carothers, Cincinnati, Ohio.—I have not heard in the paper or in the discussion what is believed by most fracture surgeons to be the most important step in the operation for the treatment of a fractured patella, namely: the suturing of the parapatellar soft tissues. Suture the bone, if you wish, though I deem it unnecessary; but, above all things, suture the soft tissue.

Some thirty years ago, I had six patella fractures over a very short period of time. I made them a subject of a paper to read at a county medical society meeting. The paper did not seem to interest the members as much as I thought it would. I asked why, and found only one man in the meeting of some 14 or 15 who had treated a patella fracture, though the addition of all their years of practice went into several hundred years. To the question, one old fellow said: "Our patients fall on soft ground." I reasoned that day: "The patella is broken when it hits some hard substance and the patient's efforts in arising cause the rupture of the parapatellar soft tissues."

THE REPAIR OF SURFACE DEFECTS, FROM BURNS AND OTHER CAUSES, WITH THICK SPLIT SKIN GRAFTS*

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Since our first publication[1] in 1929 on the use of the thick split skin graft, our tendency has been toward enlarging the field of usefulness of this graft. A notable instance is the definite finding that it can be used successfully in the release of axillary contractures and in similar deformities elsewhere over the body and extremities where formerly full thickness grafts, or even pedicle flaps, were used.[2 3 4 5] Conversely, a few uses for it that we had hoped might be successful have, so far, not proven entirely satisfactory.

An attempt will be made here to record a brief summary of our present knowledge and to illustrate certain points of importance. Each instance of use has been studied for its experimental value, and at this time it is apparent that there are still many different factors to be investigated. In all work with the transplantation of skin, it is important to realize that, so far, nothing has been suggested that can be substituted for a high standard of careful technical work in each individual patient.

The Thickness of Free Skin Grafts.—No originality is claimed for this type of graft; many surgeons use it intentionally or unintentionally when doing an Ollier-Thiersch graft. However, when one mentions a Thiersch graft, most surgeons think of a small tissue paper thin graft, the usefulness of which is extremely limited. They also visualize the graft as having been cut above the papillary layer of the skin because most texts describe it as such, but in reality even the thinnest Thiersch graft is apt to include some of the derma. Various names have been given it such as razor graft and safety razor graft.

The split skin graft can be cut in different thicknesses, usually from one-half to three-

*Read in Section on Surgery, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

*From the Department of Surgery, Washington University School of Medicine, St. Louis, Missouri.

Fig. 1

Saline bath for surgical drainage of infected burns. The bath equipment is kept as simple as possible and it is, therefore, inexpensive. About one pound of common salt is used to a tub and the solution is kept comfortably warm. Gentle debridement of the wound is done each day in the bath and any dressings that are stuck are gradually loosened. The time in the bath is from one to three hours a day and, if there is a troublesome afternoon elevation of temperature, the bath may be omitted. As soon as the granulations are clean Dakin irrigations are begun and the bath may be used less frequently or discontinued. Active motion is encouraged and many secondary contractures are completely overcome so that there may be free extension and flexion of the part at the time of operation. Someone should be in constant attendance for children.

Fig. 2

A warmed bed is useful in caring for patients with any type of open treatment. Freedom for movement is obtained and nursing care is made easier. Dressings are used if there is pain without them, if irrigations are being done or if the patient can be gotten out of bed.

fourths of the full thickness of the skin. The thickness of the skin in the donor site will vary in different parts of the body, with age, sex, the degree of nutrition and with race (*Fig. 11*).

Cutting the Grafts.—The grafts are best cut with a very sharp knife, about 18 centimeters long, and we have continued the use of the suction retractor described in 1929 so that a graft of any size is seldom cut without it. It is not a necessity, but it makes possible the rapid removal of very large grafts that are cut with a minimum of trauma.

Fig. 3

Restoration of skin of entire axillary region with split grafts.

(Top left) Because of excessive depth of the burn and subsequent thick scarring, complete healing even with deformity would not occur in this patient.

(Top center) To give the patient a short respite from his discomfort the open area was covered with homografts from his mother. These persisted only two weeks, but there was great general improvement, apparently some stimulus to spontaneous epithelization so that complete healing occurred.

(Top right) Then the deformity of the axillary region was completely opened and the defect covered with thick split grafts in one operation. Later the heavy scar over the flank was dissected out and this area also covered with thick split grafts. Note complete healing of donor areas on thighs.

(Bottom) The arm is held in the "never again" position with the aid of a large firm sea sponge pressure dressing and on the outside of this a folded infant's bed pad is used and held with gauze rolls and adhesive. No plaster of paris fixation is used.

Application and Dressing of Grafts.—It is desirable to have the largest grafts possible so that one piece (or a minimum number) will suffice for covering the defect. The size of the patient's thigh determines the size of the graft, but we have obtained them 18 inches long and 5 to 6 inches wide (*Fig. 4*). After the area is prepared, the grafts are sewed rapidly in place with running sutures of horsehair all around and many mattressing sutures throughout the surface. Multiple holes are stabbed through the grafts to allow drainage and a firm pressure dressing is applied. One to three layers of very fine mesh greased gauze (xeroform 4 per cent, zinc oxide 5 per cent or scarlet red 5 per cent) are smoothed out nicely over the area, then several layers of plain gauze and then soft damp sea sponges are held firmly in place with large gauze rolls, bandages and adhesive. The dressing fixation is considered a part of the operation and upward of 30 minutes may be required to apply it correctly in extensive cases.*

Dressing and Healing of Donor Area.—Two to four layers of very fine mesh greased gauze and then several layers of dry gauze are applied accurately over the raw area. This is held firmly with adhesive and then a larger dressing is applied. Walking is discouraged for several days and then the donor area will usually be completely healed in ten days. If the graft has been cut very deep healing will be longer, but the gauze next to the raw area should not be removed forcefully at any time. Infection in a donor area is extremely bad and is to be guarded

*If a granulating area is being grafted, the granulations are always cut cleanly away unless the condition of the patient will not permit the extra loss of blood involved, and, instead of a dry grease dressing, a wet dressing is applied with tubes incorporated in the gauze for irrigation before the sponges are applied. Other fixation of this type of graft may be had by the usual "stent" method of wrapping the graft around a dental compound mold, or a gauze form may be used.

Fig. 4

(Left) Failure of healing seventeen months after destruction of full thickness of skin, 90 degrees flexion deformity at knees. This patient was cleaned up in the saline bath and the defects were covered in two operations. As he was of large size, proportionately large grafts could be obtained, one of them measuring 18 by 4½ inches, and the area grafted at the first operation measuring 126 square inches (788 sq. cm.).

(Right) The legs are shown at the time of discharge three weeks after operation, stained and rough, but completely healed, and the patient standing for the first time in twenty months.

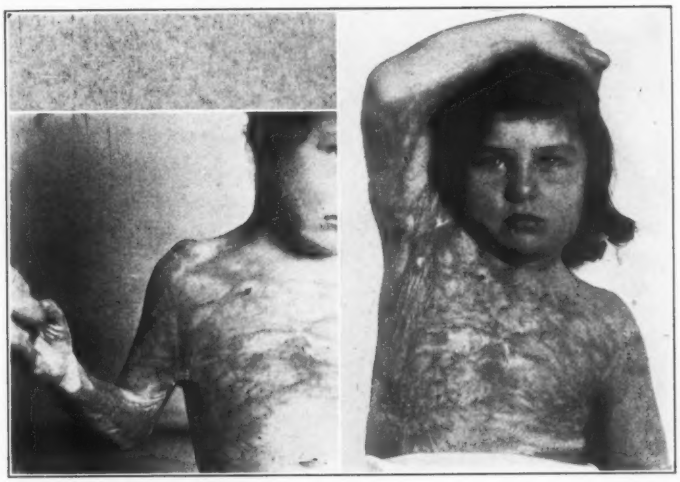

Fig. 5

Complete fixation of arm to side with loss of skin from chest, both axillary folds apex and arm. This patient was admitted with a badly infected membrane over the entire area, but could not be gotten into good enough physical condition to allow operative removal of it. After a long period of saline baths and injections during which time the arm gradually bound down to the side, she recovered sufficiently for operation and, after completely opening the deformity, the repair was done with thick split grafts in two operations.

Fig. 6

Bony deformity of lower jaw, fixation of arm to side from scar tissue contracture. Healing has occurred with the help of small deep grafts (applied elsewhere), but with a marked open-bite of the lower jaw, the molar teeth being in contact and the incisors open. The restoration was begun by completely releasing the neck deformity and covering the area with thick split grafts; at a second operation split grafts were used in the axilla and later a full thickness graft was put across the front of the neck to give the final smooth appearance.

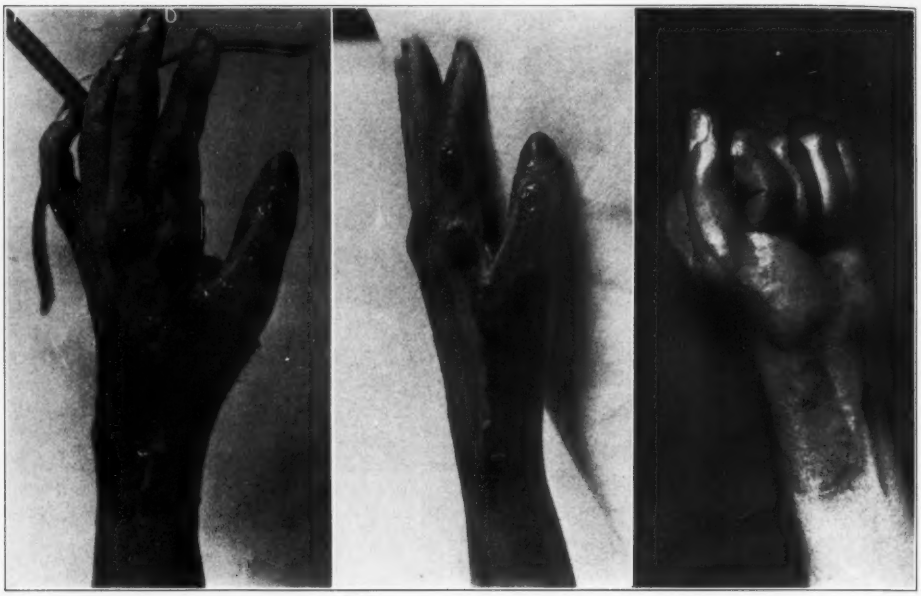

Fig. 7

(Left) Burn of hand sustained in a laundry mangle at time of admittance.
(Center) Two days after saline dressing and gentle debridement.
(Right) Patient returned to full-time position five weeks later after repair with thick split graft. No further repair necessary as shown here after six months.

Fig. 8

(Top) Leg ulcer of twenty years' duration.
(Bottom) Complete healing after application of split grafts. One operation plus a second small one when patient accidentally opened a small area.

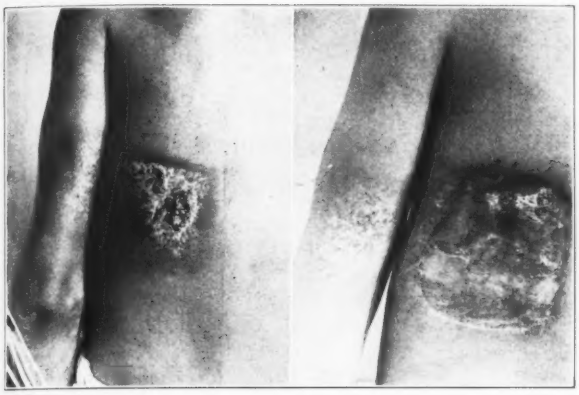

Fig. 9

(Left) Condition following exposure under fluoroscope. This is perhaps the most typical kind of lesion. There is telangiectasis, scaliness, pigmentation, ulceration, atrophy, and extreme pain. The arm shows a milder type of lesion.

(Right) After ten days of continuous hypertonic packs, the area was completely excised and immediately covered with thick split grafts from the thigh. Here there is shown complete healing after four weeks. The upper roughened area is due to delayed healing because of a blood clot. This patient was free of the extreme discomfort of the lesion as soon as he awakened from the anesthetic, and has remained so.

against carefully. If the derma has been cut through, healing will be extremely slow.

The healing apparently progresses from the small islands of epithelium left deep in the derma, and we have taken three "crops" of skin from the same donor area.

This rapid and complete healing of the donor sites makes this type of graft utilizable over larger areas than one can easily cover with full thickness grafts or flaps, and we have transferred almost 200 square inches at one operation.

The Repair of Open Wounds Due to Burns.— If a large area of the full thickness of the skin has been destroyed by a burn, the result is an open wound. These are all grossly contaminated and the first requisite in their repair is to control active infection (*Fig. 1*).

The local care of the open wounds has for its object the cleaning up of the areas as quickly as possible so that the lost surface may be restored with skin grafts. Of first importance is the realization that the patient's resistance is the principal single factor and next is the maintenance of surgical drainage. We have found that drainage is best accomplished by the use of frequently changed saline dressings or by the continual saline bath for one to three hours a day followed by dry heat or further wet dressings (*Fig. 2*). Many antiseptics have been used, but at present we rely on Dakin's solution and this over only a short space of time.

For lesions of the extremities much improvement may be found by the use of a firm pressure dressing that is kept moist by irrigation; this combined with elevation may change the entire aspect of a denuded leg within 48 hours.

It is highly important to reduce pain to a minimum by using some protector for the wound such as perforated cellophane or oil silk; usually the use of fine mesh gauze or linen next to the wound, which prevents the granulations from growing up through the meshes, proves satisfactory. Grease dressings are not used for several days before operation because they do not seem

Fig. 10

Restoration of surface of penis following slough of practically all the skin after circumcision. There has been complete restoration in one operation with a single large thick split graft from the thigh. Normal function has been obtained. Photographs of the original lesion were not obtained, but the patient was admitted in very bad condition, the corona being retracted back almost to the pubis. and the body of the penis was a foul, heavily scarred and ulcerated area. Preparation for operation was done by saline baths alone.

to promote the healthiest type of granulations. If dressings do become adherent, they may be soaked loose in the saline bath.

Direct sunlight or quartz light exposure is used frequently, but we have found no measurable improvement in wounds following its use.

One other important result from the use of the saline bath in badly burned patients is that ordinary secondary contractures will have been straightened out by the voluntary effort of the patient without the use of traction or restraints.

Fig. 11

Thickness of grafts. Three types of grafts cut from same area on same patient. The thin Ollier-Thiersch is seen to contain some derma, and has not been cut through the papillary layer. The thick split graft in this instance is about one-third of the full thickness, but they are usually somewhat thicker. The full thickness of the skin is shown below. It is evident that an appreciable amount of derma is included in the thick split graft and that there can be some voluntary variation of the depth through which it is cut.

Where there are large areas to be covered, it is necessary to develop a method of obtaining free skin grafts of suitable thickness, in large amounts, cutting them rapidly and insuring prompt healing of the area from which the grafts are taken, and we believe that the split graft usually fulfills these requirements (*Figs. 3* and *4*).

In the repair of late burn contractures as in the repair of open wounds, it is apparently not generally known that free skin grafts can be used extensively and give permanent bearing surfaces in many instances.

If the contraction is healed so that a clean operation can be done, then the use of a full thickness graft can much more safely be undertaken, but even here, oftentimes, the split graft can be used satisfactorily and may even be required if the area to be grafted is very large (*Figs. 5* and *6*).

Burns of the hands require special note because it is thought so important to have early healing, and every effort should be made to hasten surgical cleanliness so that necessary grafting can be done. Primary treatment in full thickness losses should be directed along the lines of active surgical drainage, and the average burn should be ready for grafting in two to three weeks. Even in extensive burns it is well, in many instances, to "dress" the hand with a thick split graft early so that infection is controlled and joint fixation is limited; then later any necessary thicker repair can be done (*Fig. 7*).

Leg Ulcers.—If the areas can be gotten clean enough for grafting, we have found excellent success with split grafts, and in our series we have one patient who was entirely and permanently healed in two operations after twenty years of continual ulceration (*Fig. 8*). The problem of preparation includes bed rest, elevation and elastic pressure support of the leg and mildly antiseptic wet dressings. The granulations are usually shaved off and, if there is a non-granulating base, this is removed, as it is necessary to get down to a blood supply. Postoperative care is important for protection of the graft and support of the blood column. We have proven many times that the split graft will give adequate bearing support for the lower leg and in several in-

Fig. 12
Restoration of scalp with thick split grafts after removal of a large double pedicle flap for reconstruction of the chin.

stances have covered the entire lower leg. In this group many old cases of osteomyelitis are placed, including those that are healed, but with such thin coverage of scar epithelium over the bone that it does not afford an adequate bearing surface.

Radiation Burns.—Immediate free skin grafting after excision of radiation burns has been so hazardous that some operators have preferred to wait for fresh granulations to form before covering the defect and others have preferred to use pedicled flaps. Frequently, the thick split graft can be applied immediately, however, and a permanent bearing surface obtained. Failures may be expected, but with the simplified method of obtaining this graft and with the rapid healing of the donor area, it is usually practical to go ahead with the immediate repair. One other important point is that with this graft easily available in large quantities, one might be guided to larger excisions of involved areas than if he were relying on small grafts or on trying to close the defect by undermining (*Fig. 9*).

Reconstruction of the surface of the penis has been done successfully five times with this type of graft. This is important because of the fact that reconstruction with flaps other than of scrotal skin are apt to be unsatisfactory (*Fig. 10*).

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SUPPURATION OF DERMOID CYST OF THE OVARY FOLLOWING LABOR*

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Dermoid cysts of the ovary derive their name from the fact that the most conspicuous and constant contents are of dermoid or skin origin. Skin is always found and also sebaceous secretion which forms the fluid contents. In the skin there is a growth of hair which may be slight, but there may be also a mass of hair within the cavity. However, teeth are frequently found and occasionally they may be imbedded in bone resembling a rudimentary mandible. Besides, other tissues derived from the mesoderma and endoderm may also be present. "It is said that a simple epiblastic dermoid cyst of the ovary has never been demonstrated."[1]

"The ovarian dermoid must be carefully distinguished from the congenital dermoid cysts which are sometimes found at the lines of embryonic fusion, such as the branchial clefts, and along the mild dorsal and midventral lines. These latter tumors arise from epidermal inclusions and are true retention cysts. They are therefore of an entirely different nature from ovarian dermoids, which may contain a more or less irregular growth of the three dermal layers."[2]

A. Koplowitz, M. Jacobi and N. Reibstein[3] report a case showing microscopically the following tissues: choroid plexus epithelium, pigmented retinal tissue, cartilage, notochord cells, bone and bone marrow, smooth and striated muscle, a complete cross-section of small intestine and shreds of large and small intestinal mucosa,

*Read in Section on Gynecology, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

Fig. 1
Bone and teeth seen beside rectum distended with barium. First x-ray.

stratified squamous epithelium covering dense and loose reticular fibrous tissue, the latter containing hair and hair follicles; shreds of brain tissue composed largely of glia cells and fibers and a few ganglioma cells, in places arranged to resemble cerebellar and cerebral cortex, a few pulmonary alveoli; a small piece of tissue resembling pancreas, renal tubular epithelium and a few colloid-filled thyroid alveoli, near which are a few epithelial cell nests resembling Hassell's corpuscles and surrounded by lymphocytes.

To explain the presence of such a heterogeneous collection of tissue, it is necessary to seek the origin of such tumors in an embryonic period before there is a differentiation of cells. There has been no entire accord as to how this is accomplished, but there are two prominent theories, one that one of the unfertilized germ cells is endowed with properties of division from which the tissues of the body are produced in an irregular way, and the other that the tumor is formed from a blastomere, in which a collection of cells is pinched off from the main mass in early embryonic development.

It seems to be quite clear that, whatever may be the origin of these tumors, they represent an ineffective, abortive and deformed effort to create another being contained in the ovary of the host. They, therefore, are not, strictly speaking, dermoid cysts, but are teratomata.[4]

There are two types of these teratomata: one solid, which is highly malignant, and the other cystic, which is ordinarily called a dermoid cyst. Even in the latter there is an incidence of malignancy of about 10 per cent. For practical purposes the nomenclature of "ovarian dermoid" is retained.

"When the contents of a dermoid have been thoroughly cleaned from the inner wall, as is best accomplished by washing with very hot water, it will be seen that projecting from one part of the wall is a whitish skin-like prominence to which are attached numerous hairs. This thickened portion, sometimes called the 'plug' or 'bung' of the cyst, represents the real parenchyma of the tumor, for it is in this portion that the specific tissues derived from the three embryonic germ layers may be found."[2]

"Next to hair, the most common derivatives of the ectoderm found in dermoids are epithelial formations of the mouth cavity, and of these the most frequent are teeth and portions of the jaw."[2]

During the puerperium ovarian cysts not only are especially liable to torsion, but when torsion takes place there is especial danger of infection. If the tumor suppurates, it may rupture into the

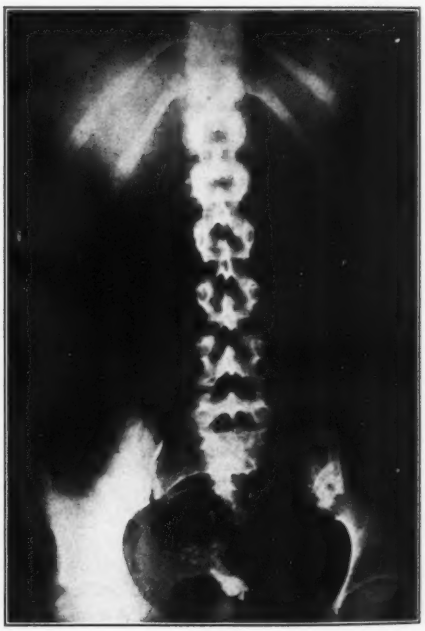

Fig. 2
Barium removed. Bone and teeth seen more distinctly.

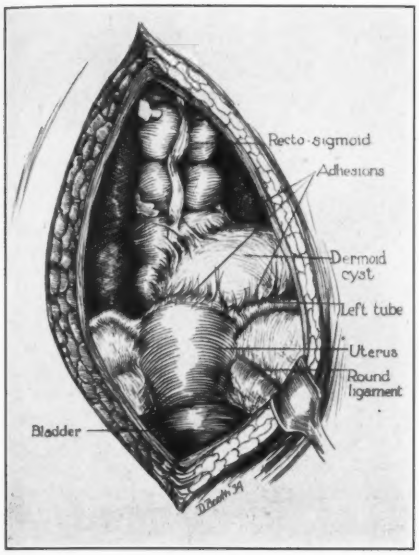

Fig. 3
Abdomen opened. Adherent sac of dermoid cyst shows distinctly.

abdominal cavity, causing fatal peritonitis, or it may break into the bladder, rectum or vagina.

"Suppuration is not uncommon, even advancing to perforation of the bladder or bowel."[5]

"A suppurating tumor is usually a dermoid cyst connected with the ovary, and hence it gives rise to a mass in the same region in which an inflammatory mass from salpingitis would be found. When suppuration takes place in an ovarian dermoid, there is a resulting local peritonitis, with fixation of the mass by adhesions. The fever and pelvic pain and marked tenderness on examination all tend to further confusion with ordinary pelvic inflammation, making the differential diagnosis often very difficult and sometimes impossible."[6]

The following case is submitted:

Case 39-41.—A white woman, married, aged 21 years, was brought to Stuart Circle Hospital on February 7, 1934, with the following history:

During pregnancy last July (1933) she developed a phlebitis in the left leg attended by swelling, and following that was up and down until the birth of her child on October 17, 1933. This took place at a hospital near her home town. Delivery was effected by easy low forceps. The baby was at full term and at the present time is well and growing and weighs fifteen pounds. She was in the hospital twelve or fourteen days and left in apparent good health. Ten days after arriving at home she began to have a fever which ranged from 99 to 103° F., was accompanied by pain and tenderness over the lower abdomen, and she was very constipated. She returned to the same hospital, where examination showed a mass in the pelvis, which was diagnosed pelvic abscess. She was given copious douches, but did not improve, and was allowed to return to her home on her request. She continued to suffer, had a high temperature and later went to another hospital in another town. On examination a mass was felt in the pelvis and she was advised to have a vaginal puncture for drainage. This was done, but no pus was evacuated. There was, however, free bleeding, which continued and necessitated two transfusions. A very foul discharge then developed from the rectum and also the same type of discharge from the vagina. She remained in the hospital sixteen days and left with a fever. Since that time she had been confined to her bed suffering from abdominal pain, temperature, foul discharge from rectum and vagina, marked constipation and loss of weight.

On admission to Stuart Circle Hospital she was emaciated, suffered from abdominal pain and some nausea, but her temperature remained normal and her blood examinations revealed a nearly normal condition. She ate fairly well. Examination of the abdomen showed marked tenderness in the lower abdomen and an adherent mass about the size of a grape fruit could be made out in the pelvis. All of the pelvic organs were fixed. There was a small sinus in the vault of the vagina.

She was kept under observation for some time in an attempt to build her up, but as the discharge from her rectum continued and it was apparent that there was a fistulous opening into the bowel, it was important to determine the site of the opening. For that purpose an x-ray of the gastro-intestinal tract with a barium enema was ordered. This did not show the fistula, but did show a body outside the line of the bowel that ap-

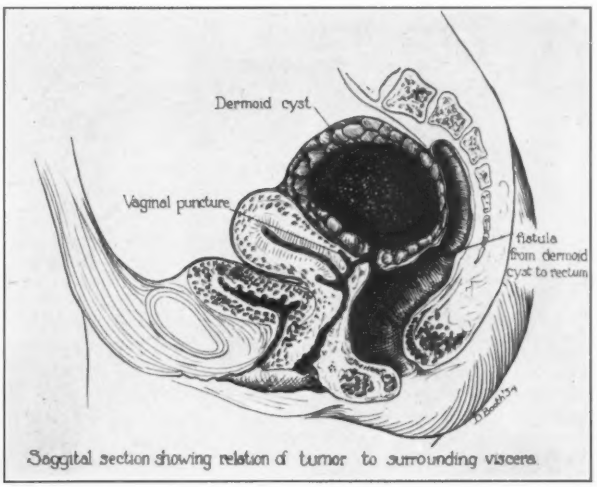
Dermoid cyst
Vaginal puncture
fistula from dermoid cyst to rectum
Saggital section showing relation of tumor to surrounding viscera.

Fig. 4
Saggital section, showing location of dermoid cyst and fistulae connecting cavity with vault of vagina and rectum.

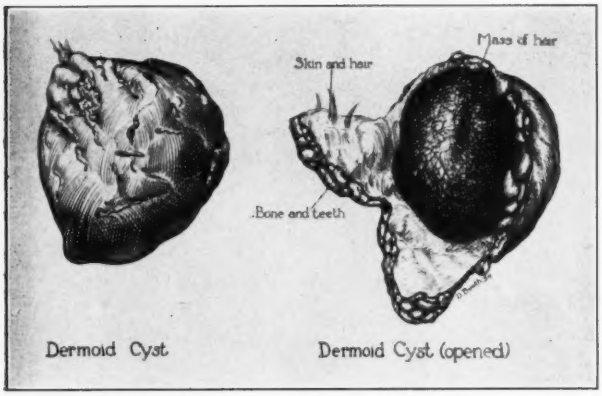

Fig. 5 Fig. 6

Fig. 5.—Dermoid cyst as it appeared after removal. Hair protruding at point of sinus.

Fig. 6.—Dermoid cyst opened and thickened part of sac or plug showing. Hair can be seen growing out of it and it contains the bone and teeth.

peared to contain teeth. This was confirmed by a second x-ray taken four days later, after the barium had been cleared from the bowel. As the site of the fistula had not been determined by x-ray, Dr. A. S. Graham was requested to make a protoscopic examination. He reported as follows:

"The protoscope passed 12 cm., at which point a small opening was found in the anterior wall, from which pus exuded. It was noted that there was considerable induration about the opening and a subacute inflammation about the entire upper rectum. The mucosa bled on slightest touch. Because of spasm of the rectosigmoid, I could not pass above this point, therefore cannot rule out other openings."

A suppurating dermoid cyst discharging into the rectum presented a condition that could be cured only by operation, but the operation presented grave difficulties. There was not only the problem of removing the infected suppurating tumor, but the still greater difficulty of handling the fistulous opening in the rectum. To repair the rectum satisfactorily in a suppurating area seemed to offer little prospect of success. It was, therefore, determined to sidetrack the fecal current by performing a temporary colostomy, and after this was known to be functioning satisfactorily and the lower bowel had been cleansed, to remove the tumor.

On March 9, 1934, the first operation was performed and the colostomy done by Dr. A. S. Graham. A right paramedial incision was made. The fundus was anterior and posterior to the uterus and filling up the entire pelvic cavity was what appeared to be a tumor of the left ovary. The small intestines showed some loose adhesions and the sigmoid was anchored to some extent to the left posterior lateral wall.

In view of the fact that the cyst of the ovary was thought to contain pus, it was determined to make no further exploration, but to do a preliminary colostomy preparatory to a radical operation for removal of the cyst and closure of the opening in the rectum, if possible.

The sigmoid was loosened up sufficiently to permit pulling it through a left muscle splitting incision. This was partially closed with silkworm gut sutures after the colostomy was done. The loop of bowel rested on a glass rod. No sutures were taken in the bowel.

The patient did fairly well after this operation, and fifteen days later the second operation was performed. The cyst of the left ovary was found densely adherent in the pelvis and filling it up. There were adhesions of the omentum from the previous operation. The tumor itself was so densely adherent in the pelvis that isolation was difficult. The opening in the rectum was located just where the rectum passed above the uterosacral ligaments. In separating the tumor, as the adhesion to the rectum was approached, there welled up a large quantity of very foul pus with a colon odor. When the tumor was delivered a ball of hair could be seen projecting from the opening. The tumor was enucleated and delivered, the pedicle clamped and the tumor removed without removing the tube. The blood supply was ligated and the pedicle sutured. The opening in the rectum was closed with Lembert sutures of chromic catgut. The pelvis was drained anteriorly with glass tube and gauze and a rubber tissue drain was placed anterior to the uterus and another under the fascia at two points. A rubber tube drain was carried through the vault of the vagina into the *cul de sac* anterior to the rectum. The object of the drainage was to keep the pus from puddling at the point of repair of the rectum. The patient had a somewhat stormy convalescence attended by very free drainage, suppuration of the wound, abdominal pain, nausea and vomiting and a gradually falling red blood count. This latter got to a point where transfusion was necessary. Following this all of her symptoms began to improve. She had a very slight rise of temperature following this operation. After the rod was removed from under the sigmoid it retracted and gas and finally feces began to pass from the bowel. The colostomy opening contracted rapidly, but did not completely heal. When she left the hospital all of her drainage wounds and the abdominal incision had healed, but there was still some discharge from the colostomy opening.

She returned to the hospital two months later, having fattened thirty pounds and looking the picture of health. The colostomy opening had nearly healed, but as there was a slight fecal drainage the opening was enlarged and a clamp placed on the septum of the bowel, which was removed after nine days.

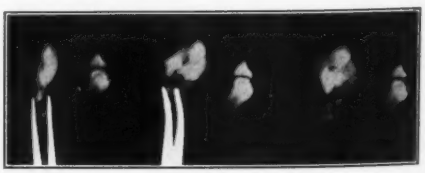

Fig. 7

X-ray of teeth after they had been dissected out of the plug.

A recent letter reports her in good condition except that she suffers at times from abdominal pain and has a pin point opening at the colostomy opening which occasionally discharges very slightly when she is constipated. Her menses returned after an absence of eighteen months.

COMMENT

Infection of the dermoid seems to have occurred previous to the vaginal puncture. It is possible that it may have ruptured into the rectum spontaneously, but the fact that the rectum was closely adherent to the anterior wall of Douglas' *cul de sac* and in line of a puncture through the vault of the vagina, makes it highly probable that the opening of the rectum was an operative accident. At our operation the vaginal fistula, the opening into the rectum and the one in the cyst seemed to enter a common cavity. The severe bleeding probably came from the rectum.

The diagnosis was very obscure and was in doubt until the x-ray revealed the teeth.

In my own practice such a case is unique and must be unusual.

The safety of the operation was doubtless enhanced by the fact that the patient was thoroughly vaccinated by the infection.

There was no possibility of the passage of the infected contents through the opening in the rectum with a spontaneous cure.

The temporary side-tracking of the fecal current by a colostomy made the successful outcome of the operation possible.

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DISCUSSION (*Abstract*)

Dr. Wm. T. Black, Memphis, Tenn.—The dermoid cyst, as well as the solid type, is teratomatous in nature. We have in the ovary in intra-uterine, life, extending to the menopausal age, numerous follicles which are developed from the germinal epithelial cells. Germinal epithelial cells are totipotent (capable of reproducing themselves).

It is possible that in the various phases of early ovular development some excitant, either a toxin or inflammatory condition, might excite to activity an undeveloped ovum. The age of development would determine whether the tumor would be solid or cystic in character. The solid tumor, of course, is from a more embryonic type of cell, while the dermoid is a more adult type of cell. Most of these follicles regress and become atretic in type; while others may not disappear, and it is possible that in this type we may have the growth of the dermoid.

The dermoid can often be diagnosed preoperatively by the x-ray. A recent dermoid about the size of a seven months pregnancy was easily diagnosed by such means, which occurred in a three months pregnancy case.

A rapidly growing tumor in a girl before the age of puberty often means an infection of the ovary complicating dermoid, or a malignant change. These tumors should always be removed intact, as the contents are very irritating and dangerous to the peritoneum. The opposite ovary should always be thoroughly examined, for oftentimes we have more than one dermoid. The case above cited had a corpus luteum of pregnancy in the ovary associated with the dermoid cyst. The successful outcome of Dr. Robins' case report proves that it was expertly handled.

THE USE OF BRONCHOSCOPY IN PULMONARY DISEASES*

By EDWARD A. LOOPER, M.D.,
Baltimore, Maryland

The art of bronchoscopy has opened up new developments in the treatment and diagnosis of diseases of the chest. Conditions which were once obscure and unrecognized are now easily and accurately diagnosed by endoscopic means.

Clinical symptoms, physical signs, laboratory studies and x-ray examinations frequently fail to give the desired information to make a positive diagnosis in many pulmonary diseases and physicians and surgeons are depending more and more upon the bronchoscopist to give the final opinion in such cases.

The importance of this work is best appreciated by those who are associated with a tuberculosis hospital in which there is a bronchoscopic clinic.

It is a common occurrence with us to discover and accurately diagnose by bronchoscopy, carcinoma of the lung, ulcers of the bronchi, polyps, bronchiectasis, fungus infections, foreign bodies and lung abscess, in cases in which every other possible method of diagnosis had been tried without success. In former days many such patients would have stayed indefinitely in hospitals, being treated in the routine way for tuberculosis.

In a study of the literature one is amazed at

*Read in Clinical Session, Texas Ophthalmological and Otolaryngological Society, meeting conjointly with Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

the increase in reported cases of lung cancer. There is no question that this disease is becoming more frequent, but many cases are now being discovered by bronchoscopic means which heretofore would have remained unrecognized.

With the improvement in surgical technic in chest operations, whereby lobectomies can be safely performed, it is not too much to expect that in the near future many lives may be saved by the early bronchoscopic diagnosis of carcinoma of the lung.

In Baltimore Dr. William Rienhoff has suc-

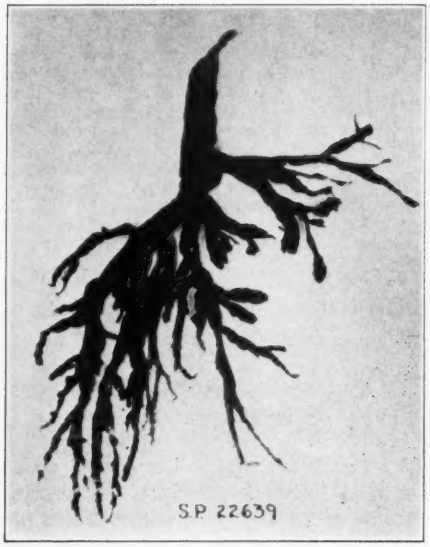

Fig. 1
Blood clot cast of trachea and bronchi.

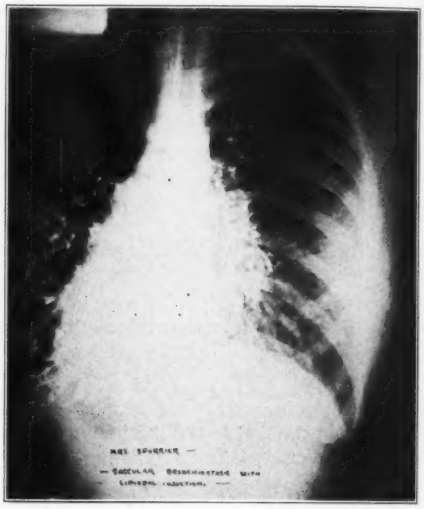

Fig. 3
Sacculated bronchiectasis.

Fig. 2
Disseminated bronchiectasis.

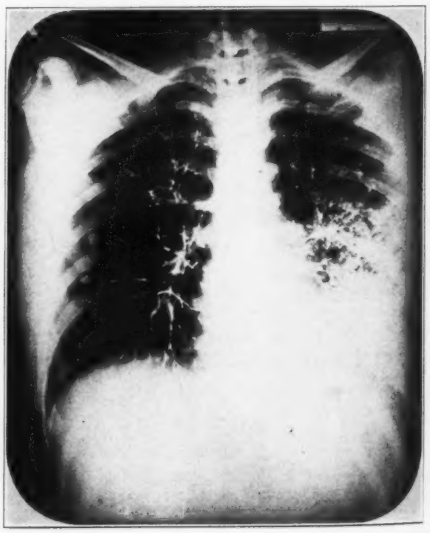

Fig. 4
Multiple lung abscess cavities.

cessfully performed ten lobectomies and two pneumonectomies without complications or fatality, thus giving us an idea of what may be expected in the future.

However, for these operations to be carried out safely the condition must be recognized early, before there is too much involvement with metastasis.

This is our responsibility, and as soon as the

Fig. 5
Central lung abscess.

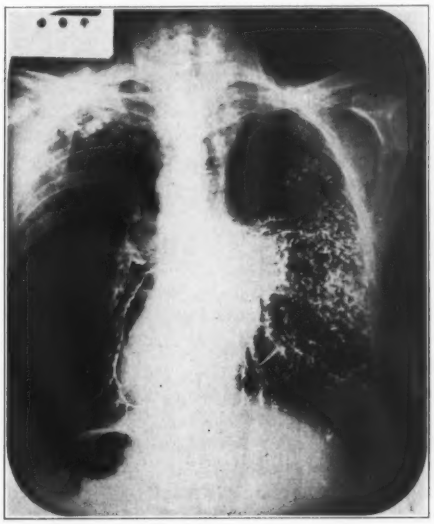

Fig. 7
Postoperative abscess due to aspiration.

Fig. 6
Abscess communicating with bronchus.

Fig. 8
Tracheo-esophageal fistula.

medical profession can be made to realize that bronchoscopy is a safe, simple and easy procedure more diagnoses can definitely be made at a time when the patient can be benefited.

In bronchiectasis, one of our most obstinate pulmonary diseases to cure, bronchoscopy offers the most satisfactory form of treatment. If the cases are seen early many can be cured. If neglected until extensive pathological changes have occurred, even many of these patients can be greatly helped.

The foul discharge can be removed, the fetid odor can be eliminated, the cough can be relieved, and many gain in weight and are generally improved.

With lung abscess, where there is communication with a bronchus, bronchoscopy is the preferred treatment and most cases will clear up. If the abscess is localized and peripheral in character, external surgery is indicated.

Benign growths, polyps, asthma, inflamed bronchi and bleeding points are easily treated by bronchoscopic methods. It is unfortunate that even at this late day bronchoscopy is associated in the minds of many only with the removal of foreign bodies. As a matter of fact, only about 2 per cent of the cases coming into the average bronchoscopic clinic are foreign bodies. The other 98 per cent of the work is less spectacular, but just as effective, since it consists in making diagnoses and in treatment of pulmonary diseases.

As this is a clinical meeting, it is my desire to present a few cases to demonstrate the value of bronchoscopy in certain obscure pulmonary conditions.

CASES

Fig. 1 is unique. It represents a blood cast of the tracheobronchial tree, due to severe pulmonary hemorrhage in a tuberculous patient. The blood clot was expelled *en masse* and the patient recovered. It also demonstrates the immense surface area of this terminal system of tubes which can be explored and treated only by endoscopic means through the small opening between the vocal cords.

Fig. 2 illustrates the value of pneumonography in undetermined pulmonary suppuration. By clinical symptoms, physical signs, x-ray examination and laboratory studies, it was impossible to make an exact diagnosis in this case until bronchoscopic methods were employed which demonstrated a disseminated bronchiectasis.

LUNG ABSCESS

Many cases of lung abscess can be cured by bronchoscopy. If the abscess communicates with a bronchus, this form of treatment is indicated. An abscess which is well localized and near the periphery of the lung should be drained by surgical means, but many cases are centrally located so that surgery cannot be employed. In such patients bronchoscopy offers the only hope of relief.

It is also impracticable to operate upon lungs with multiple abscess cavities, so that endoscopic drainage must be employed.

Fig. 3 demonstrates how the types of bronchiectasis can be differentiated by injection of iodized oil. This patient had numerous areas of sacculated bronchiectasis.

Fig. 4 shows numerous multiple abscess cavities which are inoperable and which should be aspirated by bronchoscopic means.

Fig. 5 demonstrates a large abscess in the central part of the lung, well outlined by iodized oil. Such a case could not be drained externally, but must be treated by bronchoscopy.

Fig. 6 is the type of lung abscess which communicates with a bronchus and can be treated very successfully by bronchoscopy.

Fig. 7 is of a patient who developed a lung abscess after an operation for an intestinal obstruction, due to aspiration of some infected material. Bronchoscopic treatment is indicated in such cases.

Fig. 8 is a tracheo-esophageal fistula in which the barium passed into the bronchi from the esophagus, giving a beautiful outline of this structure.

TULAREMIA: FATAL CASE OF THE TYPHOID FORM CAUSED BY INGESTION OF RABBIT: AUTOPSY REPORT*

By HARVEY G. BECK, M.D.,
and
WALTER C. MERKEL, M.D.,
Baltimore, Maryland

There are few instances recorded in medical literature which better serve to illustrate the triumph of medical science over disease in man than that which relates to the study of tularemia. Although the disease has only recently been discovered, sufficient knowledge has accumulated to form the basis upon which an accurate diagnosis may be established and methods formulated for prevention.

The condition which primarily affects animals, and secondarily man, was not recognized until 1912, when McCoy and Chapin[1] reported the discovery of a specific organism (*Bacterium*

*Read in Clinical Session, Medical, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

tularense) which was responsible for a plague-like disease prevalent among ground squirrels in California.

With the exception of a few isolated human cases reported by different observers, no systematic clinico-pathological studies were undertaken until 1919, when Dr. Edward Francis,[2] of the United States Public Health Service, and his co-workers began an exhaustive investigation in order to determine the nature and etiology of a disease known as "deer fly fever," then prevalent among the ranchers in Utah. The result of their investigation established the fact that the disease was caused by the specific organism (*B. tularense*) previously described by McCoy and Chapin. They further ascertained that the disease is almost invariably fatal in susceptible animals and that it is transmitted from animal to animal through the bites of blood-sucking insects: flies, ticks, lice and possibly fleas. The disease is widespread in the United States in the cotton tail, snowshoe and jack rabbit, about 1 per cent of which are infected. In the brief period which has elapsed since Francis' discovery of the disease entity, human cases have been recognized in all the states except Main, Vermont and Connecticut. It is now known to exist also in Ja-

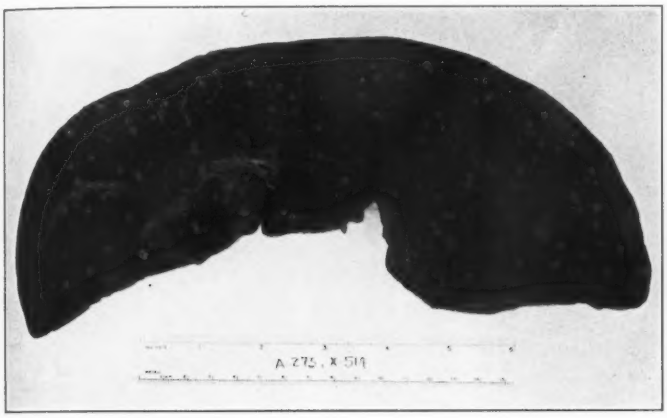

Fig. 1
Liver showing multiple foci of necrosis. Note the uniform distribution and uniformity of size.

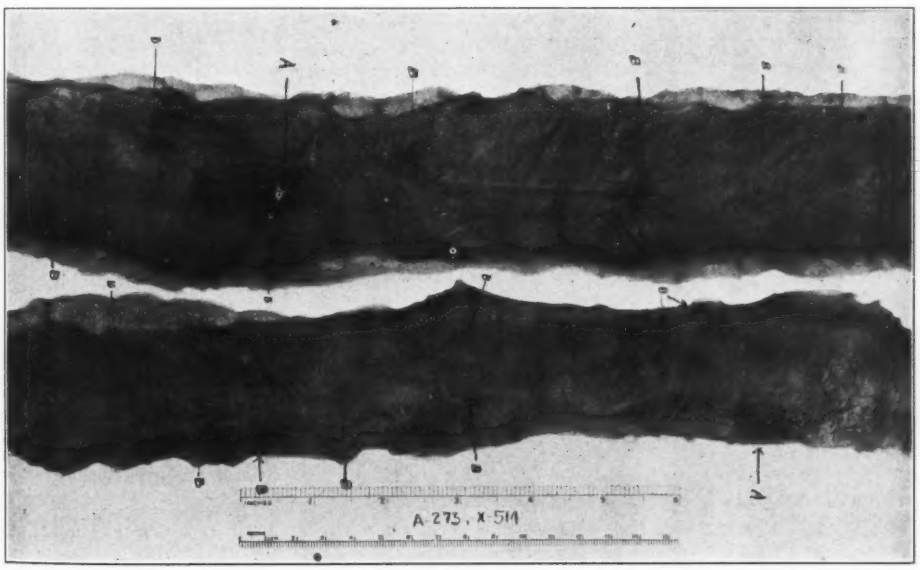

Fig. 2
Intestine (ileum). Note the dark color, hyperemia and edema. The segments represent the middle and distal portions of ileum. A. Large ulcerated Peyer's patches. B. Multiple small punctate ulcers. Many are too small to be seen on photo.

Fig. 3

Photomicrograph of liver showing focus of necrosis. Note sharp line of demarcation, leukocytic infiltration and coagulation necrosis. The cellular infiltration consists of phagocytic cells, polymorphonuclears and lymphocytes.

pan, Russia, Norway, Sweden and Canada. In the United States there were only fifteen cases reported before 1924. In 1932 there were 3,653 cases with 179 deaths, a mortality of 4.9 per cent.

Mode of infection.—There is no authentic record that the disease has ever been transmitted from man to man. It is invariably transmitted from animal to man, either by direct contact or by insects which carry the organism from infected animals, and rarely by ingestion of infected rabbits.

(1) The most frequent source is through direct contact with the hand in skinning and dressing wild rabbits infected with tularemia, especially if there is a cut or an abrasion of the skin. That the disease may be transmitted through the normal skin was experimentally demonstrated by Ohara,[3] the Japanese investigator, who produced it in his wife by rubbing a few drops of blood from the heart of a naturally infected rabbit on the dorsum of her hand. There are many other susceptible animals through which the disease has been conveyed to man, notably wild rats, mice, sheep, muskrats, opossums and quail.

(2) It may be caused by the bites of blood-sucking ticks and flies which previously fed on infected animals.

(3) Sixty-four cases of primary eye infections have been reported. The infection is conveyed by the fingers which have become contaminated through handling the organs of an infected rabbit or by crushing infected wood ticks or flies and rubbing the eyes.

(4) Thirty-seven instances are on record of infections among laboratory workers in eleven laboratories. Fifteen among the personnel of the United States Public Health Service developed the disease. It usually occurred in those engaged in performing autopsies on experimentally infected rabbits, guinea pigs or mice, or

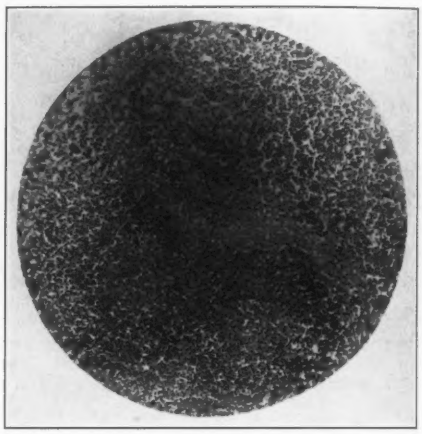

Fig. 4

Photomicrograph of spleen showing focus of necrosis and sharp line of demarcation. There is no hemorrhage.

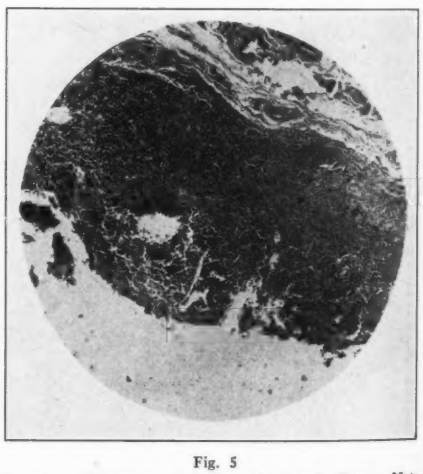

Fig. 5

Intestine. Photomicrograph through ulcer in ileum. Note the necrosis and leukocytic infiltration with superficial ulceration. An interesting observation is the absence of cellular infiltration in the submucosa and muscularis.

handling infected ticks. Seventy-two per cent of these were of the typhoid form.

(5) The statement has been made repeatedly that the disease is not caused by the ingestion of rabbit. However, Francis[4] cited two instances of family outbreaks which have been reported, and a third instance which will be reported later.

The first outbreak was reported by Freese, Lake and Francis.[5] In this family the father, aged 37 years, daughter, aged 7 years, and son, aged 2 years, became suddenly ill the same evening and died of tularemia after an illness of eight days, eight days and six days, respectively. Another daughter, aged 6 years, who became ill the following evening, survived. The mother and three other children remained well. Although accurate data bearing on the source of infection were meager, it was ascertained that there was an epidemic among the rabbits and that they were caught by the dog in the open field. After being skinned and dressed by the father and mother they were served as a common food for the table. They were fried in grease and eaten by all members of the family except the mother.

The onset in all the infected cases was abrupt and accompanied with fever. The three children vomited and the boy in addition had convulsions. The father was nauseated and complained of headache and chills. All of them developed conjunctivitis and swollen lymph nodes in the parotid region. There were no local skin eruptions. Later the cervical and axillary lymph nodes became swollen. No necropsies were performed.

In the Hygienic Laboratory a demonstration was made on an experimental rabbit dead of tularemia which consisted of frying in grease for ten minutes pieces of meat rolled in graham flour from the lumbar region. Although it was thought to be sufficiently cooked, red streaks of muscle were found near the bones. Subcutaneous injection of the meat and expressed juice into guinea pigs caused death after an acute illness with typical lesions of tularemia.

The second outbreak reported by Crawford[6] occurred in a negro family in South Carolina. Three out of seven children died from eating a rabbit found dead. The youngest, aged 14 months, died on the fourth day. A boy aged 2 years died in convulsions on the sixth day, and a boy aged 10 years died the fourth week from an abscess of the lung and pneumonia. The mode of onset and symptoms were similar to those in the first family group infected.

The third instance relates to two hunters who killed a rabbit, which they hastily cooked and ate. The usual symptoms developed within 24 hours after eating the rabbit. Both died, and one of them was autopsied. These cases were studied by Amoss and Sprunt.[7] Their results will be reported later.

The case herewith presented is another instance in which the disease developed as a result of ingestion of improperly cooked rabbit. Features of special interest in connection with our case are that the disease occurred in an individual suffering with hemochromotosis; that it was of the typhoid form which is quite rare, having occurred only twenty-eight times in a series of six hundred and seventy-nine cases studied by Francis, and although it is the eighteenth reported case which has come to autopsy, it is probably the first one which definitely belongs to the typhoid group, and the first case in which the characteristic lesions were demonstrated in the stomach and intestines.

CASE REPORT

Among the outstanding features to be stressed in this report are the following, namely: ingestion of insufficiently cooked rabbit; development of symptoms within twenty-four hours; generalized infection, typhoid form; characteristic tularemic lesions in stomach, intestines, mesenteric lymph nodes, liver and spleen; death on twelfth day; and hemochromatosis. Autopsy was done.

T. W. A., a white man, aged 61, was taken ill December 12, 1933, complaining of weakness, nausea and anorexia. On the second day, when he was seen by Dr. Nathaniel Beck, he complained of other symptoms such as fever, headache, general muscular pains and vomiting.

Except for occasional attacks of grippe, the patient had no illnesses prior to May, 1930, when he began to complain of nervousness, insomnia and constipation. A complete diagnostic study at that time showed that he had a transient glycosuria, tenderness over the liver (which was slightly enlarged), cyanotic discoloration of the hands, bradycardia, hypotension, lymphocytosis, negative Wassermann and blood sugar of 117 mg. per 100 c. c. of blood. He ate only two meals, smoked eight to ten cigars a day, but never used alcohol.

On examination, April 21, 1933, the liver was again found enlarged and tender on palpation. At this time he manifested many symptoms of hypothyroidism and the basal metabolism was —23.9 per cent. These symptoms improved on thyroid medication, but his general condition remained unchanged. The urine continued to show sugar periodically and the discomfort in the right upper quadrant persisted. Before the onset of his recent illness he felt, as he expressed it, "worn out" and "tired."

The history leading up to his last illness was as follows: the patient went hunting on December 11 and shot three rabbits, which he skinned the same day. His wife fried one of the rabbits the next day. While it was frying, but still almost raw, he cut off a piece of the meat and ate it. It was ascertained that he frequently ate raw meats, for which he had an inordinate craving. Both he and his wife ate some of this rabbit for dinner. A day later his wife cooked another rabbit, which he refused to eat, stating he "felt sick" and was not hungry, but had an insatiable thirst.

All of the initial symptoms became gradually worse. He became profoundly toxic and a low muttering delirium developed not unlike that of typhoid fever. His

temperature was 102° on the second day. After a remission, it reached 105° on the fifth day, but the pulse up to this time remained relatively slow, ranging from 72 to 90 per minute. Agglutination tests on December 18 were negative for tularemia, typhoid and paratyphoid A and B.

On admission to Union Memorial Hospital December 19, he was examined by Dr. France and Dr. Jarvis. His temperature was 105°, pulse 106, respiratory rate 42, and blood pressure 130 systolic and 80 diastolic. He was in a semi-comatose state. When roused, he was confused and irrational. His face was flushed and the skin warm and dry. There was no evidence of any fresh skin lesions on the hands and face except some labial herpes and there was no local or general enlargement of the lymph nodes. The pupils were equal, regular in outline and responded to light. The conjunctivae were not inflamed. There was no ocular palsy and no facial asymmetry. The tongue was dry and heavily coated. No foci of infection were found in the mouth. There was some rigidity of the muscles of the neck. The chest was well developed, emphysematous in type. Expansion was equal, somewhat limited, but respirations were quite rapid and regular. The percussion note was normal throughout except over an area the size of the palm of the hand in the left base posteriorly, where it was moderately dull. Numerous fine and coarse rales were heard over both bases; however, more marked over the area of dullness, where they were of a "sticky" character. There was no increase in transmission of breath sounds or voice conduction. The area of cardiac dullness was normal and there was no disturbance of rhythm or abnormality of sounds.

The abdomen was thin walled and slightly pendulous. The lower border of the liver extended four finger-breadths below the right costal border. The edge was sharp, firm and regular in contour. The spleen was barely palpable. There was no suggestion of ascites or peripheral edema. Upper tendon reflexes were present and equal on both sides. Other reflexes, including abdominal, cremasteric, knee and patellar, were absent.

Dr. Futcher, who examined the patient on the following day, noted that the face exhibited a dusky cyanosis and the finger nails a bluish discoloration. On percussion and auscultation the chest revealed no abnormalities anteriorly. Posteriorly over the right subscapular region and lower interscapular area, the percussion note was moderately impaired and resistance increased. Expiration was a little high in pitch. There was no tubular breathing, but numerous medium moist rales with a consonating quality were heard. Similar changes were noted in the left base, but the signs were less pronounced. He also detected some enlargement of the liver, slight rigidity of neck muscles and absence of patellar reflexes. Koernig's sign was positive. He likewise failed to find any cutaneous lesions or involvement of the superficial lymph nodes.

Blood serum tests were made at this time for agglutination with tularemia, typhoid, paratyphoid A and B, typhus and undulant fever. Paratyphoid A and B were positive in all dilutions of 1-20. The others were entirely negative. On the day of admission the blood showed: hemoglobin, 92 per cent; red cells, 4,500,000; white cells, 6,320; and a differential count of polymorphonuclear neutrophils, 88 per cent; eosinophils, 1 per cent; small mononuclear, 8 per cent; large mononuclear, 1 per cent. Five days later (on the day of his death) the total leukocyte count increased to 21,250 and the polymorphonuclear neutrophils decreased to 66 per cent. Blood Wassermann and repeated blood cultures were negative. Blood sugar was 140 mg. per 100 c. c. and nonprotein nitrogen 37.2 mg. per 100 c. c. The urine contained a trace of albumin and occasional granular casts, but no bile or sugar. The stool contained few white cells and was fairly positive for occult blood. No parasites were found.

The spinal fluid was under normal pressure; clear; no exanthochromia; no abnormal cells; Pandy negative; sugar 75.5 mg. per 100 c. c.

Guinea pig inoculation with blood and tissue obtained at autopsy proved positive for tularemia.

The patient's course while in the hospital was steadily down hill. He lapsed into deep coma and became extremely cyanosed as a result of respiratory failure. There was no response to the administration of caffeine hypodermically, glucose intravenously or oxygen per nasal catheter. The patient died on the fifth day in the hospital and on the twelfth day of the disease.

POSTMORTEM EXAMINATION

Gross Description.—There was a generalized erythematous mottling and faint yellowish tinge of the skin. All the superficial lymph nodes were negative. Both thoracic and peritoneal cavities contained a small amount of fluid. The abdominal viscera were deeply injected, edematous and moderately distended. The mesenteric, epigastric, as well as the lymph nodes along the diaphragm, head of pancreas and in the posterior mediastinum, were enormously enlarged. Some of them measured 3 cm. in diameter. These were reddish brown in color, and on section showed large areas of necrosis. The surface of the liver was studded with discrete areas, many of which were umbilicated and yellowish grey in color. Grossly these had the appearance of metastatic neoplasms. The gallbladder and ducts were essentially negative. The lungs were characterized by fibrous pleuritis and moderate edema, but no evidence of any pneumonic process. The heart revealed no important changes. The liver weighed 2,925 grams and measured 11 x 17 x 5 inches. It was firm and elastic in consistency and covered with numerous discrete necrotic areas described above. The cut surface of the liver showed a uniform distribution of sharply defined foci of necrosis, averaging approximately 0.5 cm. in diameter. The liver tissue was firm and had a dark reddish brown color which was typical of hemochromatosis. The spleen weighed 500 grams and measured 6 x 4½ x 2½ inches. The pulp had a soft, mushy consistency. There were definite areas of necrosis that could be identified grossly. The pancreas was characterized by diffuse scarring and had a brilliant reddish brown color. A number of the lymph nodes, particularly the ones that were not too necrotic, also showed this brownish pigmentation. The stomach revealed several small superficial ulcers on the greater curvature at the pyloric end. These were surrounded by a zone of hyperemia. The ulceration was about 2 mm. in diameter. Several similar ulcers were encountered in the first portion of the duodenum. The lower third of the ileum and ascending part of the colon were studded with small superficial ulcers averaging from 2 to 5 mm. in diameter, surrounded by a zone of hyperemia. The mucosa, in general, was edematous and congested, and Peyer's

patches were hyperplastic, deeply injected, and several were ulcerated.

The other organs and tissue showed no changes except the usual pathology of infectious diseases.

Microscopic Description.—Sections of the lungs reveal no unusual pathology other than that of small infarcts and areas of atelectasis together with edema and moderate congestion.

Sections of the liver show definite cirrhosis of a portal type and marked pigmentation throughout the liver tissue. The Kupffer cells are loaded with a golden brown pigment which gives a positive reaction for iron. Numerous discrete areas of necrosis are encountered which bear no distinct relation to the lobules. Many of them, however, are seen in the intermediate zones. The necrotic areas are characterized by an infiltration with leukocytes and large phagocytic cells. Polymorphonuclears and small lymphocytes are seen in about the same ratio. No giant cells are observed. There are, however, masses of a granular pink staining protoplasm-like substance which is interpreted as coagulated protoplasm. Similar areas of necrosis and brownish pigment, intra- and extra-cellular, appear in the lymph nodes and spleen. The pancreas shows diffuse fibrosis, and large phagocytic cells are seen along the fibrotic tissue. These are loaded with a yellowish brown pigment. There is also a reduction in the number of islands of Langerhan and a number show definite fibrosis.

Sections from the intestinal ulcers and Peyer's patches show typical necrosis and leukocytic infiltration. An interesting observation is that the cellular infiltration is confined to the mucosa, and in none of the sections does the submucosa and muscularis show any inflammatory reaction.

Bacterial stains made on sections from the various organs showing necrosis do not reveal any structures that could be definitely interpreted as bacteria. However, because the *Bacillus tularense* is gram negative it could be overlooked very easily in the tissue stained, particulary in the presence of extensive necrosis.

The thrombosis in the capillaries such as was described in the microscopic study by Gundry and Warner,[8] who mentioned that necrosis might be secondary, was not observed in the lesions of our case. There was no definite relation of the necrosis to the capillaries which was particularly true in the sections of the liver, where the necrosis was seen chiefly in the intermediate zones. However, patches were encountered in the capsule as well as along the portal tracts.

Bacteriological Postmortem.—Blocks were removed from the liver, spleen and lymph nodes. These were macerated and a portion was injected into a guinea pig subcutaneously. A small emulsion was fed to another guinea pig. Both died on the fourth day. The autousy findings revealed extensive necrosis of the liver, spleen and lungs, which was seen in both pigs. Cultures on cystine glucose agar showed small gram negative bacilli. These were indentified as tularense bacilli.

Pathological Diagnosis.—(1) Typhoid tularemia characterized by ulcerations of the gastro-intestinal mucosa, including the stomach, duodenum, ileum and head of cecum.

(2) Multiple areas of focal necrosis of the liver, spleen and regional lymph nodes.

(3) Generalized cloudy swelling of all the viscera.

(4) Congestion, edema and infarction of the lungs.

(5) Hemochromatosis.

(6) Portal cirrhoses and diffuse fibrosis of the pancreas.

(7) Fibrous pleuritis.

(8) Moderate arteriosclerosis.

The interesting pathologic features in this case are the absence of cutaneous lesions, the presence of ulceration of the gastro-intestinal tract and necrosis of the liver, spleen and lymph nodes, particularly those in the region connected with the gastro-intestinal tract. The absence of the typical pulmonary disease is probably a definite proof that the portal of entry was through the gastro-intestinal tract, as was demonstrated by the intestinal lesions and the areas of necrosis of the liver, regional lymph nodes and spleen.

Blood cultures are of little diagnostic value in tularemia, as ordinarily no growth is obtained. The only two cases reported in which positive blood cultures were obtained were those of Gundry and Warner and Francis and Callender.[9] Palmer and Hansmann[10] reported positive cultures of the heart's blood obtained at autopsy. In these three cases the organism was isolated by animal inoculation with blood. This was not done in our case. The agglutination tests made by the City Health Department were reported negative.

CLINICAL TYPES OF TULAREMIA

Francis divided tularemia into four clinical types:

(1) *Ulceroglandular.* — The most common form (80 per cent) is characterized by an initial lesion of the skin in the nature of a papule which develops into an ulcer, followed by regional enlargement of the lymph nodes draining the site of infection.

(2) *Oculoglandular.*—The primary lesion occurs in the eye. Accompanying symptoms are conjunctivitis, lacrimation, photophobia, and pain with secondary involvement of the preauricular, postauricular, submaxillary and superior cervical lymph nodes.

(3) *Glandular.*—This rare form is without any demonstrable primary skin lesion, but with enlargement of the regional lymph nodes, the infection apparently penetrating through a normal intact skin.

(4) *Typhoid.*—A form in which there is no primary lesion and no secondary enlargement of the lymph glands.

To these four types a fifth, pneumonic, has

recently been added, in which the lesions are largely confined to the lungs.

Haizlip and O'Neil[11] reported a case of meningitis due to *B. tularense*, and as typical tularemic lesions have been found at autopsies in the brain (Hartman)[12] and in the meninges (Bryant and Hirsch),[13] a cerebral type should be considered.

Our patient presented certain symptoms suggestive of cerebral involvement, but unfortunately the brain and cord were not obtained at autopsy.

Aside from the features mentioned which differentiate these various types, there are others which are common to all of them. The period of incubation ranges from one to nine days, averaging three and one-half days. The onset, which is usually sudden, is characterized by headache, vomiting, chills, muscular pains, sweating, prostration, fever and a moderate leukocytosis. The fever is characteristic and runs a course of two or three weeks. There is an initial rise which lasts from one to three days, followed by a remission for a similar period. This is followed by a secondary rise, after which there is a steady decline to normal.

Fever is the outstanding symptom of the typhoid form. In many respects it resembles typhoid fever so closely that the disease cannot be differentiated clinically. The relatively slow pulse in the early stage with a remittent type of fever, abdominal tenderness, palpable spleen, profound toxemia and low, muttering delirium are so characteristic of typhoid that the diagnosis can be made with certainty only by animal inoculation or agglutination test. The history of exposure to a possible source of infection and the usual brief incubation period are important factors leading to a correct diagnosis.

The earliest positive agglutination test which occurred in ten of Gundry and Warner's fifteen autopsied cases, appeared on the ninth day, the latest on the nineteenth day. On an average they were negative until the fourteenth day. This no doubt accounts for failure in getting a positive reaction in our patient who died on the twelfth day.

Since the publication of Gundry and Warner's tabulation of autopsied cases of tularemia, two additional cases have been reported: one of the pneumonic type by Cudger[14] and one of the ulceroglandular type by Hartman, Beaver and Green.[15]

None of the autopsied cases hitherto reported exhibited typical tularemic lesions in the stomach and intestines. In three of the series reported peritonitis was observed. In the fourteen completely autopsied cases described by Gundry and Warner tularemic pneumonia occurred in ten. The pneumonic type of tularemia has undoubtedly been frequently unrecognized clinically in the past. Archer, Blackford and Wissler[16] found roentgenographic evidence of pulmonary lesions in 32 of 34 cases studied. Thirty-six per cent of the fatal cases are of the pneumonic form. In comparison to the high incidence of the pneumonic form the typhoid form is rare. As a consequence knowledge concerning the latter is still meager. One should feel it his duty to study and report individual cases. It is especially important to secure autopsies for the sake of acquiring more accurate information with regard to the pathology of the disease.

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CHRONIC ULCERATIVE COLITIS*

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Ulcerative colitis is a localized or diffuse inflammatory condition of the colon, of unknown etiology, with a predilection for the lower part, and with the anatomical picture of bacillary dysentery. It is now universally agreed that the disease is a definite clinical entity. Bacteriologic and protozoologic studies have failed to yield an etiological agent, but have ruled out many suggested causes. Because of the high mortality rate, the term "colitis ulcerosa gravis" is used by the German authors.

REVIEW OF LITERATURE

The condition was first described by Wilks[1] in 1875 following postmortem studies. Hale White,[2] in 1888, presented a detailed account of 3 cases. The subject was not investigated further until the introduction of the sigmoidoscope, when the Royal Society of Medicine[3] presented 189 cases from the records of various hospitals. Hawkins,[4] in 1909, gave a detailed analysis of a large series of cases from St. Thomas Hospital. Further progress was made by White,[2] who introduced the proctoscope, and by Hurst,[5] who rescued sigmoidoscopic examination from its position as a surgical procedure. The work of Schmidt,[6] Mathieu and Roux[7] (1911-13), brought this subject again to the attention of the medical profession. The interest of American workers was stimulated by the report of Logan[8] in 1919 dealing with the etiology and clinical specificity of this condition.

The etiology of this disease is still an open question. Crohn and Smithies[20] believe that it is the result of focal infection, the primary focus being in the paranasal sinuses, teeth or tonsils and the blood stream, the route of dissemination. This view is also held by my colleague, Dr. Jelks,[33] of Memphis.

Kiefer[29] claims that this condition is primary amebiasis with an associated secondary ulcerative colitis. The Craig complement fixation test yielded positive findings in 74 per cent of his 40 cases and anti-amebic treatment gave favorable results in many of the cases in which the test was positive.

Hurst, Mackie, Leuston, Bassler and Einhorn claim that from 20 to 40 per cent of the cases are sequelae of bacillary dysentery. Silverman and Harris[11] conclude from their study of 100 cases that the Flexner, Shiga and Duvall bacilli are the usual causative organisms, but that the Morgan bacillus No. 1 may also occasionally be encountered. The work of Thomas T. Mackie is, in my opinion, conclusive, and the technic followed will stand any contradiction. His percentage of 20 to 40 was proven by most careful bacteriological and serological study which confirms the work of Hurst.

Hern,[20] in 1931, states that ulcerative colitis is not a modified form of bacillary dysentery and that the cases in which dysentery bacilli are found are readily differentiated clinically from chronic ulcerative colitis.

Bargen[12] (in personal communication of September, 1934) states that he is convinced that the cases yielding dysentery bacilli on culture have a different pathological basis from ulcerative colitis. In 1931, he ran agglutination tests on the sera of 20 unselected cases of ulcerative colitis to determine the presence of antibodies for members of the dysentery group. Entirely negative results were obtained with Shiga and the Hiss Russell organisms.

The Flexner bacillus was agglutinated in 2 cases only (1:10 and 1:20). In 56 cases, where the bases of the ulcers were cultured after proper preparation and curettage, the cultures were negative for members of the bacillary group. The only non-lactose fermenting bacilli isolated were *Bacillus pyocyaneus* and *Bacillus morgan* No. 1.

Bargen[13] has isolated a diplostreptococcus which he claims is the etiologic agent in this condition. He recommends the following technic to facilitate the isolation of the organism. The cotton swab which has been rubbed on a rectal ulcer or dipped in a small quantity of feces or rectal discharge is used to inoculate several tall tubes of Rosenow's dextrose brain-broth medium. After 6 hours' incubation, material from the bottom of these tubes is transferred to new tubes of dextrose brain-broth and into shake cultures of blood agar and incubated for 12 hours. Often the organisms can be picked from the first blood agar plate, but they are less likely to be overgrown in a plate made from the second tube of dextrose brain-broth. The typical colonies of the diplostreptococcus can be recognized by the surrounding greenish zone in which there is slight hemolysis. It is gram positive and in early subcultures it appears in groups of only 2 or 4, but after repeated subcultures it tends to form chains like any other green producing streptococcus. It does not ferment inulin; it usually does not ferment mannite, and if it does, the action is only slight. It does not ferment dextrose, lactose, saccharose, maltose, raffinose and salicin. On mannite agar, it forms a fine translucent color. It does not grow on gelatin and coagulates milk only slightly, if at all.

Bargen's[22] latest report covering the last ten-year period gives the following salient statistics: "1,348 patients with the definite syndrome were treated with the vaccine; 898 (67 per cent), are free of symptoms; 620 for 3 years or longer: 132 (10 per cent), are dead, some of complications, some of intercurrent infections. Of the remaining 318 (23 per cent), 6 per cent show marked improvement; 4 per cent are still under treatment; 8 per cent show no improvement (this includes the group with severe complications), and 5 per cent are untraced."

Gaither[27] refuses to accept the diplostreptococcus of Bargen as the etiological agent of this condition on the following grounds: (1) Bargen established the diplostreptococcus as a separate tribe of bacteria purely on morphological grounds, a procedure contrary to bacteriological methods. (2) Bargen failed to state clearly the cultural reactions of his diplostreptococcus.

Brown[21] and Paulson[28] also object to the conclusions

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of Bargen for the following reasons: (1) there is neither satisfactory direct evidence nor properly controlled confirmatory studies to establish a specific or primary etiological association between any bacterium and chronic ulcerative colitis; (2) experimental data indicate the non-specificity of bacterial influences in this disorder; (3) the cocci found are responsible probably for secondary infection. Nevertheless, Paulson[28] summarizes as follows: "Since there is no specific therapy and since a specific etiological factor, if there is any, remains to be determined, the therapeutic response is not specific and the management consists of rest, psychotherapy, diet, drugs, vaccines, serums and instillations. In ulcerative colitis, it is felt that any procedure offering the slightest possible relief may be justifiably used."

Bassler,[30] in 1933, presented the bacteriologic findings in 50 cases of ulcerative colitis in which the presence of amebiasis and bacillary dysentery was ruled out. He states: "In a large number of cases met with in this country, true dysentery organisms are infrequently encountered and reported." He questions the etiologic significance of Bargen's diplostreptococcus in this condition and cites the findings of Rafsky and Nannheim, who, employing Bargen's technic, concluded: (1) the diplostreptococcus is not the specific agent; (2) it is present in other conditions; (3) it is not uniformly present in ulcerative colitis. Bassler[30] found the diplostreptococcus in 44 per cent of his cases of chronic ulcerative colitis, and in 37 per cent of 50 cases of colitis which were non-specific and non-ulcerative in type. He concludes (1) that this diplococcus is only the enterococcus, a normal inhabitant of the intestinal tract, for the morphological and biological properties of the two organisms are identical in all respects; (2) when grown symbiotically with other organisms, it may have significance in this condition; (3) the specific selective localizing affinity of these organisms for the colon has not been conclusively proven, and the results of laboratory experiments are directly opposed to this theory.

Bassler,[30] in his series of cases, isolated the *alpha, beta* and *gamma* types of streptococcus from the feces. The hemolytic types are pathogenic and therefore of etiologic significance, but the non-hemolytic varieties only enhance the toxic action and growth of hemolytic strains. The organisms may be found in the mesenteric lymph nodes during the later stages of the disease. The non-hemolytic types do not arise by mutation from the hemolytic strains.

The exacerbations that occur in this condition are due, according to him, to the development of hypersensitivity by the mucosa to the bacterial toxins.

The remissions, on the other hand, follow desensitization as immune bodies are developed. The state of immunity is always of short duration. Vaccines made of mixed cultures of streptococci should be of greater benefit than those containing only the Bargen's diplostreptococcus, in the light of Bassler's findings.

PATHOLOGY

Parts of the intestine are affected in the following order of frequency: (1) pelvic colon and rectum; (2) descending colon; (3) cecum and ascending colon; (4) transverse colon; (5) terminal portion of the small intestine. The disease invariably begins in the rectum and spreads upward to the ileum. The complete destruction of the entire affected organ is pathognomonic of fatal ulcerative colitis. Usually, the entire large intestine is disintegrated and its original pattern destroyed. The mucosa and the submucosa, alternately thickened or thinned, are replaced by granulation tissue or are ulcerated, leaving the muscularis as the base of the ulcer, and irregular islands of mucosa along the axis of the intestine. The submucosa contains islands of regenerated hypertrophied epithelium. The entire colon is friable. The terminal ileum, if involved, is diffusely inflamed and ulcerated.

The pathology of ulcerative colitis may be divided into six stages, which may be closely followed clinically with the aid of the sigmoidoscope, namely: hyperemia of the mucosa followed, respectively, by edema, necrosis, miliary abscess formation, ulceration and cicatrization.

In the early stages, the sigmoidoscope reveals a granular, glazed mucosa, which bleeds readily. Large quantities of creamy, discolored pus may enter the tunnel of the scope. Progression of the process produces necrosis and confluent shaggy ulcers which are connected by strands of normal mucous membrane. Finally, all layers of the colon are involved and are replaced by granulation and fibrous tissue. Only an island of edematous mucous membrane remains and this is likely to become polypoid and, eventually, malignant. It may be practically impossible to introduce a procto-sigmoidoscope in the end stages. The terminal clinical picture may be that of sepsis with metastatic abscesses in the visceral organs.

DIAGNOSIS

A thorough anamnesis is essential for the diagnosis of chronic ulcerative colitis. The onset of symptoms is insidious, in contrast to the acute onset found in bacillary or amebic dysentery. The most constant findings are tenderness in the left iliac region along the course of the pelvic colon, gaseous distention, flatulence, pylorospasm, pain following meals, regurgitation of food, occasional loose stools, and abdominal hypersensitivity. The occurrence of one to two stools following breakfast, associated with nausea and exhaustion, is suggestive of the presence of this condition. Later, the stools become more frequent and are accompanied with some tenesmus and a sense of uneasiness in the rectum. Gradual progressive loss of weight, anorexia, irregular gastro-intestinal disturbances, asthenia, pallor and evidences of an irritable nervous sys-

tem are noted. All these symptoms are often erroneously attributed to the presence of hemorrhoids. The patient usually continues with his work. Remissions of a few months' duration are common at this period. Soon the exacerbations become more numerous and last longer.

The patient becomes markedly anemic, develops sitophobia and spends one-third of the day at stool. Defecation now causes considerable pain and may last for as long as one hour. There are blood and pus in the fecal contents. The condition is aggravated by septic symptoms which usually occur during the exacerbations and consist of the following findings: septic temperature, rigors, violent abdominal pain associated with frequent evacuations from the bowel of blood and mucus. Digital examination of the rectum now reveals a constricted sphincter and nodular, tender mucosa. Proctoscopic examination shows a markedly congested mucous membrane which bleeds at the slightest touch of the proctoscope and is studded with shaggy ulcers and numerous miliary abscesses.

On physical examination, there is generalized tenderness and muscle spasm over the abdomen. The latter may be as severe as that found over a perforated diverticulum. The descending colon is rigid, tubular and very tender on palpation. Roentgenological studies, following barium enemas, are valuable aids in diagnosis and prognosis. They reveal the presence of unsuspected complications and the extent of involvement, and in the few cases in which the rectum is uninvolved, they may be the only method by which a positive diagnosis can be rendered. The characteristic x-ray findings are narrowing, shortening, mural thickening and mucosal destruction of the colon.

The rectum and sigmoid were found to be mainly involved in our series by this method of examination. In this type, Bargen found a diffuse symmetrical involvement of the circumference of the bowel, uninterrupted narrowing and shortening of the colon. The smooth contour or absence of haustral markings did not seem to be entirely diagnostic of chronic ulcerative colitis. The outline was smooth and the ulcerations and granulations usually were superficial, but when they became deep, the contour became fringed, uneven and feathery.

Specimens taken through the proctoscope consisted of soft, bloody mucopurulent material which, on microscopic examination, showed leukocytes, red blood cells, debris and streptococci. The presence of parasites was ruled out by repeated direct smear examinations. Bacteriological studies were made according to Bargen's technic as outlined above.

Differential Diagnosis.—Amebic dysentery is most easily confused with this condition, especially in the South. The finding of motile or encysted endamebae is diagnostic of protozoal infestation. However, the proctoscopic picture differs in the two diseases. In amebic dysentery, the ulcers are circumscribed, have elevated margins, definite areolae of hyperemia and crater-like bases covered with necrotic material, and the mucosa between the ulcers is practically normal; whereas, in ulcerative colitis the mucosa is hyperemic and the wall of the intestine contracts even during the early stages.

Tuberculous colitis also presents a difficult problem in differential diagnosis. The history of tuberculosis of the lungs, usually in the advanced stages, is of great aid. The ulcers in tuberculosis are situated in the lower portion of the rectum, are shaggy, irregular, with edges undermined and usually are very large. The mucous membrane between the ulcers is apparently normal.

COMPLICATIONS

Distribution of 268 complications in 693 cases of chronic ulcerative colitis is presented by Bargen as follows:

COMPLICATIONS IN 693 CASES OF CHRONIC ULCERATED COLITIS (FROM BARGEN)

Complications	Cases	Per Cent
Polyposis	69	10.0
Stricture of bowel	59	8.5
Arthritis	30	4.33
Perirectal abscess	26	3.7
Perforation of bowel	18	2.6
Cutaneous lesions	17	2.45
Malignant disease	15	2.16
Renal insufficiency	8	1.5
Splenomegaly	7	1.0
Endocarditis	7	1.0
Ocular disease	5	.7
Rectal hemorrhage (fatal)	3	.4
Mesenteric thrombosis	1	.15
Tetany	1	.15

In our study of chronic ulcerative colitis we attempted to demonstrate the three agents which have assumed major importance in the etiology of this condition, namely: the dysentery bacillus, the *Endameba histolytica* and Bargen's diplostreptococcus. We have failed to isolate any of the members of the dysentery group nor have we been able to demonstrate agglutinins in the sera of our patients against these organisms. In

our first series of cases we also failed to find the diplostreptococcus of Bargen. However, the isolation by Bargen of the diplostreptococcus in 80 per cent of his cases, the fact that he obtained permanent cures in 40 per cent by autogenous vaccination with the same organism and the confirmation of his findings by many workers (Soper,[14] Streicher and Kaplan,[15] Lynch,[16] Fradkin and Gray[18] and Crohn and Smithies[20] caused us to repeat Bargen's work. In 1932, after personal communication with Dr. Bargen,[12] procedures identical with those carried out under his supervision at Rochester were adopted in our laboratory. We were aware of the attitude of many workers in this field (Brown[21] and Paulson[28] towards Bargen's results and their conclusions that the diplostreptococcus is the ordinary enterococcus, a normal inhabitant of the gastro-intestinal tract. But the isolation of diplostreptococci from thrombi of the mesenteric vessels and from small abscesses complicating this disease and the reduction in number of ileostomies performed at the Mayo Clinic since the use of the specific vaccine, convinced us that as a method of treatment, Bargen's work deserved further consideration.

A study of 16 typical cases of chronic ulcerative colitis occurring over a period of two years is presented. They were private patients and were treated at the Baptist Memorial Hospital at Memphis, Tennessee. In 8 (50 per cent) of the cases, we were able to isolate Bargen's diplostreptococcus. In 2 (16 per cent) only *Streptococcus hemolyticus* was found. In 2 (16 per cent) both the diplostreptococcus and *Endameba histolytica* were isolated. Our control series consisted of similar cultural studies on 12 patients suffering from the following morbid conditions of the gastro-intestinal tract; carcinoma of the rectum, sepsis and secondary ulcerative colitis. In only one control case (8.8 per cent) were we able to isolate the Bargen's diplostreptococcus.

Eight cases were treated by Bargen's method of autogenous vaccination. Only those patients showing beneficial results from initial treatment with the autogenous vaccine were continued on doses of 0.5 to 1 c. c. at weekly intervals. The exact dosage was regulated by the local reactions. Five of the 8 have shown remarkable improvement and have been in remission for 18 months. Two cases have been considerably relieved (about a 50 per cent cure). One patient has died. Although this series is small, we believe that the results carry statistical significance when we recall that the former methods of treatment were 100 per cent failures.

In evaluating the efficacy of therapeutic measures, it must be remembered that this disease is characterized by occurrence of spontaneous remissions. The different types of treatment recommended for this disease are as numerous as its supposed causes. The treatment of *Types 3* and *4* cases was formerly considered a surgical problem, but now they also are treated medically. Enemas, irrigations and instillations of solutions containing the following therapeutic agents are variously used and with varying degrees of success, mercurochrome, silver nitrate, tannic acid, silver protein and chromium sulphate. In our hands, these methods, as well as non-specific vaccine and anti-amebic therapy, failed. Our first efforts with Bargen's method of autogenous vaccination also failed. Our therapeutic goal has always been to combat the inflammatory process in the colon. In the treatment of this condition the following factors must be taken into consideration, (1) the patients are critically ill; (2) they have a pronounced secondary anemia; (3) they have become intolerant to foods with resulting vitamin deficiency; (4) varying grades of local intestinal disease are present. Our first objective was to treat the patient's general condition; second, to remove all foci of infection; third, to institute the proper dietary regime and as soon as possible to put the patient on a generous diet; fourth, to immunize or desensitize against the offending organism; fifth, to treat the condition locally to alleviate pain, opium being used guardedly.

Neither Bargen's concentrated serum nor vaccines made of stock strains of diplostreptococci were employed; only autogenous vaccines. Tincture of iodine was used orally in a number of cases. Blood transfusions were used. The majority of the patients were found to be hypersensitive to milk by food allergy tests, but we still do not believe that there is any connection between the two conditions. Exacerbations frequently followed acute infections or the removal of foci of infection, findings which confirm the belief in the infectious origin of this disease.

From our experience gained in the treatment of the above series of cases, we conclude that the present methods of treatment are still inadequate. The Bargen's method, which attempts to desensitize against the diplostreptococcus found in the gastro-intestinal lesions, is a distinct advance over any of the previously described methods. Furthermore, we feel that uncomplicated

ulcerative colitis is a medical problem, but when severe complications set in, the patient should be assigned to surgery for treatment.

SUMMARY

In the present report, the author has reviewed the etiological aspects of this condition and the methods which are advocated for its treatment in the light of the bacteriological and pathological findings. The laboratory findings in a small series of cases are presented.

CONCLUSIONS

(1) Bargen's method of treatment is a valuable adjunct in our threapeutic empiricism, although its role as the etiological agent in this condition is not universally accepted.

(2) Chronic ulcerative colitis should be recognized and treated early. Complications in the late stages resist all methods of treatment.

(3) Every case of ulcerative colitis must be studied proctoscopically, microscopically and roentgenologically.

(4) The different types of colitis, namely, infectious, ulcerative, hemorrhagic and idiopathic, may represent distinct clinical entities or may be various stages of the same process.

(5) Further unbiased work must be done before this condition is placed on a definite etiological basis.

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DISCUSSION (*Abstract*)

Dr. T. T. Mackie, New York, N. Y.—In the past, investigations into the nature of chronic ulcerative colitis have been directed largely to the study of the bacterial background and the effort to demonstrate that the disease is the result of infection by a specific race or strain of bacteria. Our studies have supported the contention that the bacterial flora is variable. The evidence at present available does not warrant the assertion that the disease has a specific etiology.

This does not imply, however, that the factor of infection is unimportant. On the contrary, it is my belief that properly performed bacteriologic studies constitute an essential step in the preparation of an adequate therapeutic program for the individual case. The requisite bacteriologic examination is not a simple procedure. Single negative observations by culture or by the agglutination reaction may be misleading, and if too much importance is attributed to them may seriously limit the scope of treatment. When such studies demonstrate the presence of a potentially pathogenic organism autogenous vaccine may have definite therapeutic value. Stock vaccines and sera, however, are seldom helpful.

Although I believe the factor of infection to be highly important in the etiology of chronic ulcerative colitis, clinical studies strongly suggest that other factors enter importantly into the mechanism.

In the course of these investigations we were early impressed with the appearance of indications of deficiency disease in certain of our severe cases, and subsequent studies have shown that we may expect to find such complications in from 60 to 65 per cent of consecutive unselected patients. The indications of deficiency fall under several headings.

There are changes in the buccal and lingual mucous

membrane analogous to those observed in tropical sprue, in pellagra and in pernicious anemia. There are alterations in the skin which are analogous to those encountered in pellagra and in vitamin A deficiency.

Examination of the blood in several severe cases has shown reduction of the total plasma proteins with inversion of the albumin-globulin ratio. These changes have been associated with edema and anasarca. As these abnormal chemical values improve under treatment, the abnormal fluid distribution disappears. In many of the severe cases the electrolyte content of the blood is adversely affected, notably the blood calcium, which is somewhat lowered, and the total blood base, which may be below normal levels.

Studies of the anemia accompanying ulcerative colitis present further evidence of the deficiency factor in the disease mechanism. Several of our cases having had monthly blood counts over a period of two years or more, have shown periods when the anemia is hypochromic and microcytic. At other times the blood cell diameters increase. The color index varies irregularly to both sides of unity, but does not remain fixed for a sufficient period of time to constitute a base line which would permit evaluation by specific therapy. On the other hand, this latter type of anemia, under adequate liver extract dosage, is rapidly changed to the hypochromic type with constant low color index. Massive administration of iron will then produce the response which is desired. We have recently had a case under observation for well over a year which has exhibited both of these phases and recently the blood picture changed to a definite macrocytic anemia with a constantly high color index and many macrocytes in the stained film. Under massive parenteral liver extract therapy this anemia was promptly relieved.

These indications of deficiency disease have occurred for the most part in patients under hospital observation who were receiving diets which should be adequate in every respect. The lack of evidence pointing to incomplete digestion led us to consider the possibility that they might result from impaired absorption from the small intestine. Dr. Robert E. Pound, of the Fifth Avenue Hospital, has consequently devised a simple radiographic technic which we have applied to a considerable number of patients in the effort to obtain x-ray data concerning this segment of the intestinal tract.

In all the cases of ulcerative colitis with indications of deficiency disease, and in eighteen cases of tropical sprue, we have found abnormalities constantly present in the small intestine. These often extend from duodenum to ileocecal junction. They appear to represent two different sets of phenomena. There is impairment of normal motor activity as shown by irregular forward progress of the barium through the intestine and often a slowing of the rate of passage, and there is evidence of loss of tone of the intestinal musculature as shown by areas of dilatation without accompanying obstruction. The pattern of the mucous membrane is definitely abnormal in these cases. The markings of the valvulae conniventes are distorted and widened, presenting an appearance which one would expect to find associated with edema of the mucosa.

We are not able as yet to evaluate the physiologic significance of these intestinal changes, nor to define the factors which are responsible for their development. It seems not improbable, however, that they may contribute to the complex clinical picture with which they are often associated.

These observations have led us to believe that chronic ulcerative colitis is not a localized disease of the digestive tract. It frequently involves other systems and thereby complicates not only the clinical picture, but the problem of therapy. In our experience very careful and complete study of the individual patient is essential. The therapeutic approach must be highly individualized and adapted to the changing requirements of the particular patient, and to the varying phenomena presented by different patients.

Dr. Rudner has offered further important evidence against the concept that the etiology of the disease is settled and that its therapy is simple. Much further study is necessary before these objectives are reached.

Dr. Lee Rice, San Antonio, Tex.—No one plan of treatment can be applied to each individual, nor do I believe that all have a specific infection when they are found to have a chronic ulcerative colitis, but I do make the point that Bargen's vaccine frequently aids in the treatment, and to argue that his diplococcus is never, or is always the cause, confuses the issue. Certainly one injection of the vaccine each week will do no harm nor subject the patient to excessive expense, and it may do a little or a great deal of good. Combined with all other supportive, dietary and acceptable therapeutic measures, many of these patients can be relieved or even cured. There is an occasional acutely ill patient who might be saved by surgical intervention, and the chronic case with marked narrowing and thickening of the colon with continued ulceration may be relieved by appendicostomy or ileostomy.

AUTONOMIC INSTABILITY: IS IT AN ENTITY?*

By J. Shirley Sweeney, M.D., Sc.D., F.A.C.P., Dallas, Texas

I wish to present what I believe is the most common condition encountered in general diagnostic work, one about which there is very little crystallization of thought, and one about which comparatively little is known in a positive and practical sense.

It is becoming conspicuously more obvious that a large part of our medical efforts, both preventive and curative, today must be directed toward that large group of disorders that we think of as constitutional manifestations. We have fairly well defined the limits of microbic diseases and our preventive and curative procedures are reasonably clear cut. But that group of diseases which includes hay fever, asthma, hypertension and its fatal consequences, diabetes mellitus, pernicious anemia, and, in the

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light of more recent knowledge, possibly malignancies, plus that group of less serious, though most annoying, functional disturbances, such as glandular imbalances, the menopause, and autonomic instability, as yet challenge our therapeutic acumen. It is the last named disorder to which I wish to invite your attention.

I wish to say in the beginning that I shall not attempt to discuss the neurological phase of the subject. My purpose is to present a clinical description of a very frequent visitor to physicians' offices; one who frequently transfers his patronage from one physician to another, and finally, all too often, falls into the hands of those who capitalize upon our mistakes and inadequacies. I refer to the patient who presents himself usually with a multiplicity of symptoms which, when analyzed, are not strictly consistent with any known entity, although frequently they may simulate, in some respects, such disorders as hyperthyroidism or gallbladder disease. After a careful diagnostic study is completed, including indicated laboratory data, the diagnostician is still without convincing and adequate information with which to make a diagnosis. Unfortunately, at this stage the physician often tells the patient there is nothing wrong, which too frequently only temporarily satisfies the sufferer because he actually has symptoms and is functionally sick. Or, after the patient has made repeated visits to the physician without relief, in desperation and with the conviction that something must be done, it is decided to operate. Following surgery, the patient may do better for a time only to have a recurrence of his previous symptoms. The physician may make a diagnosis of nervous indigestion, nervous stomach and intestines, irritable heart, nervous exhaustion, and place the patient on a regimen of treatment which only too often accentuates and perpetuates his symptoms. After repeated therapeutic changes the patient finally decides to try another physician. The patient never receives a satisfactory explanation of his troubles and, as a result, either relentlessly seeks help, frequently from irregulars, or hopelessly gives up and returns to a state of unnecessary semi-invalidism. I have only intimated some of the numerous and sundry experiences the patient has who possesses an inherently unstable autonomic or sympathetic nervous system. It is a lamentable commentary to add that almost anything may happen to him because he is a pathetically gullible individual harassed by most persistent and annoying symptoms.

Next I wish to sketch briefly some of the most frequent symptoms the autonomically unstable individual presents and suggest a symptomatic classification of the more prominent types. After analyzing some three hundred of my own cases that received a clinical diagnosis of autonomic instability, I find that complaints referable to the gastro-intestinal tract are by far the most frequent. Those in whom the gastro-intestinal symptoms predominate I shall classify as the gastro-intestinal group or type. It is impossible in the short space of time permitted me to do other than list some of the most characteristic complaints of this group.

The most frequent symptom of all groups was that of abdominal pain or discomfort. The type of pain complained of varied, of course, from a dull hurting to sharp shooting pains. The lower right quadrant was the site of most frequent discomfort. This location is unfortunate for the patient and it is really amazing to see the number of individuals who have right abdominal scars and are sans appendices who continue to have the same pain they had before surgery was done. The next most frequent complaint was of constipation. Constipation has really become so universal that patients frequently do not think of mentioning it as a symptom unless they are asked specifically about it. These sufferers have usually become addicted to the use of purgatives or enemas, which of course do them no lasting good. Next in order are complaints about belching, gas in the bowels, no appetite, vomiting, heart burn, loose stools, and so on.

All of the evidence we can get in such cases (barring of course frank findings of gallbladder disease, peptic ulcers and the like) leaves us with only a diagnosis of "some functional disorder." Of course one might say the trouble is a metabolic disturbance involving calcium, phosphorus, and so on. This may be true, but it is yet unproved and is certainly more theoretical than factual. The more these individuals are studied the more they are seen to be similar in many respects. It is of course true that the various symptoms may vary markedly in their severity, but interestingly enough their severity seems to vary in proportion to their duration.

Just what the mechanism is in such cases, as I said in the beginning, I shall not attempt at this time to describe technically. It would seem that there is an imbalance in the autonomic nerve supply to the gastro-intestinal tract and that, in most instances at least, we are dealing with a hypertonic left colon and its associated

and resultant symptoms. It seems reasonable to explain constipation as caused by an overcontracted left colon; right lower abdominal soreness and discomfort as due to a resultant distended cecum; and the associated gas and gastric manifestations as a result of, or a part of, the altered sympathetic nerve activity (which controls secretory as well as motor function) to the entire tract, and abnormal colonic behavior. Certainly barium enema studies tend to substantiate such an explanation. Still more convincing are the striking clinical results that are obtained by nothing more than clear explanatory talks to the patient and simple, sensible hygienic suggestions to live by.

The next group to be considered is what I have called the cardiorespiratory group. Heretofore many who fall within this classification have been diagnosed as having some half-way entity, called neurocirculatory asthenia, cardiac neurosis, irritable heart, and so forth. After all, they are but victims of the same inherently unstable autonomic mechanism as the group just described, except that symptoms referable to the cardiac and respiratory systems predominate. It is of course obvious that any of the groups to be mentioned will have overlapping symptoms. It is just this fact that has prompted me to present the subject I have chosen and plead for its consideration as an entity with a polymorphous symptomatology.

In the cardiorespiratory group the complaints that are usually heard are those of palpitation, pounding of the heart associated with a distinctly uncomfortable sensation in the cardiac region, rapid heart beat and shortness of breath. All of you are familiar with these symptoms and elaboration upon them is superfluous. I wish to add only that, in such cases, our various diagnostic attacks yield us no evidence of organic disease and again we hedge with a diagnosis of "some functional disorder" and permit the patient to leave our offices thinking he has an irritable or nervous heart, which to him spells disease. I wish to say just a word about the symptom of shortness of breath. I do not mean a true dyspnea, but refer to the characteristic sighing type of respiration that many lay people interpret as shortness of breath. This type of breathing has been conclusively shown to have no organic explanation.

The functional explanation of these symptoms I shall not attempt to give other than to point out that they are apparently a result of a poorly balanced autonomic nerve control of the heart and respiratory mechanisms.

The next group I have called, for want of a more comprehensively descriptive term, the neurocirculatory group. There are a multitude of symptoms to be listed under this classification, some of which are difficult to explain and possibly more accurately should be placed in one of the other groups. But for the purpose of defining more sharply the gastro-intestinal and cardiorespiratory types, I have included them under the neurocirculatory classification. Some of the more frequent complaints are easy fatigability and exhaustion, nervousness, cold sweating hands and feet, numbness of the hands and feet, headache, tenseness, irritability, sneezing, generalized body aches and pains, tightness in the throat, and so on. It is obvious that it is impossible at this time to consider these symptoms individually, but they are some of the more common ones presented by the patient who is functionally sick as a result again of an inherently faulty working sympathetic nervous system.

As we examine them physically, we may find them of normal weight or overweight, but more often they will be found to be thin, tense, serious, absorbed individuals. Their pupils are often dilated, their hands and feet cold and moist and usually show a mottling discoloration. The peripheral vessels are often indistinctly palpable. Their pulse is usually slightly accelerated and their blood pressure is most often low. So much for a bird's-eye view of the general physical state of the neurocirculatory type. In the gastro-intestinal group, aside from the general make-up just described, we find upon examination of the abdomen usually a distention of varying degree, and a palpable cord-like left colon, which is often tender. The cecum can usually be outlined and is found to contain gas and there is usually a well defined localized soreness over this area. The only additional finding of significance in the cardiorespiratory group and the one that is most frequently present is a rapid heart rate which characteristically varies considerably during examination, often as much as from 10 to 30 beats per minute.

For the purpose of being complete, I should include in passing another group which I have called the psychoneurotic group. Under this

classification would fall those patients whose complaints are more genuinely mental. I refer to those who are victims of severe phobias, involutional psychoses, frank defense complexes, or marked depressions. These individuals really belong to the psychiatrist. They are mentioned here only to complete the list of the functional disorders of the type considered in this paper.

Before taking up the treatment of autonomic instability, I wish to summarize for the purpose of emphasis the main points of what has just been said. First, we are seeing an increasingly large number of "functionally sick" people who as a rule remain "sick" because they are treated for "something." Second, I have attempted to combine or correlate various and different manifestations and symptoms into a single entity and have suggested that they are fundamentally effects of the same physiological disorder. Third, I have intimated that it would be helpful if the various specialists would recognize the symptoms of such disordered physiology as related to their fields and handle such cases in some more uniform and effective way. Fourth, it should be emphasized that these patients should receive a most careful and complete diagnostic study to be sure there is no organic pathology masquerading under apparently functional symptoms. Lastly, I wish to add that the analysis and classification that I have just presented can at best serve as only a temporary one. Further careful clinical observations will give us a more accurate definition of this rapidly growing and poorly differentiated syndrome of our clientele.

As to the treatment or management of this type of patient, I am convinced that the one best prescription is to describe for him in a clear, simple, convincing and intelligent way how and why he has the symptoms of which he complains. Make him understand that there are different constitutional types whose sympathetic or autonomic nervous systems will function abnormally when their conscious state is one of tension or when it is bombarded constantly by more or less disturbing and annoying experiences. Crude, though cogent, illustrations are the phenomena of nervous polyuria, the loose stools from excitement or fear, blushing or blanching of the skin, the "indigestions" following the taking of food when mentally or emotionally upset. The average patient will understand if the description is made clear, and once he does, then he knows why he has symptoms and his "disease" disappears. Then it becomes easier for him to develop an attitude of indifference, which is of fundamental importance. Make him understand that his reactions are natural or inherent, but that, with time and patience, he can train himself to be less sensitive to his environment. Much could and should be said regarding this phase of the management of the autonomically unstable individual, for herein lies success or failure in our efforts. It is sufficient to say that this analysis for the patient should be based on broad but comprehensive biological, philosophical and physiological concepts regarding man and his relation to society.

More specific or concrete directions that have proven helpful to such patients have been the taking of hot and cold shower baths each morning, followed by vigorous rubs and deep breathing exercises. It should be pointed out to the patient that such practices are supplemental measures and are designed to aid normal physiology. For the hypotensive group (and most of them are in this group) a diet rich in animal protein is suggested, buffered with fresh fruits. And for the group possessing a hypertonic left colon a non-residue diet is helpful. Again it should be emphasized that the bowel is not diseased, but that such a dietary regimen is advised in order to lessen intra-intestinal stimulation and is given purely for mechanical reasons.

Occasionally it is wise to give some mild sedative in small doses. The patient should understand that it is given simply as a crutch to help him in his effort to relax and be indifferent, and will be discontinued as he improves. Phenobarbital in half grain doses mid-morning and mid-afternoon has been the drug of choice in my practice.

In conclusion, I wish to say that these patients should be seen at fairly frequent intervals for a while, principally for the purpose of reemphasizing the functional phase of their trouble and for the purpose of encouragement. The results in the large majority of such cases are amazingly gratifying.

Medical Arts Building

FURTHER OBSERVATIONS ON JUVENILE DIABETICS AND HYPERINSULINISM*

By ARTHUR A. HEROLD, M.D., F.A.C.P.,
Shreveport, Louisiana

There are, perhaps, no diseases which call for individualizing in children as much as the dysfunctions of the endocrine glands. The variations from the adult normal are such that in children they become almost different diseases, which go from one extreme to the other, especially if we resort to specific or gland-substitution, therapy. In no conditions is this fact better illustrated than in hyper- or hypo-insulinism, the latter being commonly known as diabetes mellitus.

As this paper is intended to deal only with late developments in these fields, I have no intention of boring you with a lengthy dissertation on the history of this interesting subject or of tracing the evolution of our present day ideas of its etiology or treatment. On the other hand, it is my purpose to take up where I left off in previous papers and to discuss my conclusions then, as well as the conclusions of others, with reference to diabetes in general and juvenile diabetes in particular; then to refer to later work in this disease, as well as in the opposite condition of hyperinsulinism.

In a paper read by me before the American College of Physicians in 1928, entitled, "Diabetic Therapy, with Special Reference to the Newer Remedies," I concluded:

"The outlook is bright for the large army of diabetics. We believe that, although for the present our main reliance should continue to be insulin and proper diet, the many investigators working on this problem will soon be rewarded; especially do we feel that Frank and his associates have blazed a trail and that something on the order of synthalin will be found which will prove a boon to these unfortunates and will replace insulin as a routine, but not, of course, in coma, surgical complications and in very severe acute cases."

To date, developments along these lines have been so slight that the deduction must be made that I was a better optimist than a prophet!

In a paper read before the Louisiana State Medical Society in 1930, entitled "Juvenile Diabetes," I summarized as follows:

"(1) Juvenile diabetics require more exact care and individualizing than do adults. (2) Heredity, infections and obesity are the general etiological factors. (3) Prophylaxis, then, is to prevent or eradicate infections and to fight obesity in children of diabetic heredity. (4) If properly treated, the prognosis is good as to life. (5) Diabetic children require care as to diets, especially total calories; all require insulin, which should be regulated according to food, weight and activity. (6) Some other preparations are of value at times and surgery gives hope of proving to be a panacea."

Along these same lines, Dr. H. J. John, of Cleveland, presented a paper before the American College of Physicians last April, entitled, "The Diabetic Child." His summary coincides with mine, except that obesity in children does not present a major etiologic problem, notwithstanding Joslin's expressed opinion to the contrary. Everyone who is familiar with Dr. Joslin's teachings (or should I say "preachings"?) is aware of the warning which he gives, based on his own experience, against obesity in children, especially if there is a diabetic family history!

In a paper read before the Sixth District Medical Society of Louisiana in 1933 I summarized thus:

"(1) The great awakening in diabetic therapy dates from the Banting-Best work which gave us insulin. (2) No satisfactory substitute for insulin has yet been put forth, although many preparations lower blood sugar, notably synthalin, a remedy for oral administration. (3) Surgery offers hope in selected cases, especially juveniles, and, with further improvement of details, it will probably come into more general use. (4) High-carbohydrate-low-calorie diets are becoming more popular. The old idea of high fats is viewed with apprehension in many quarters. Ample carbohydrate, with careful restriction of total calories, has been claimed by some to permit definite reduction in insulin dosage. (5) Late reports of work from Montreal show that there is an insulin-stimulating hormone in the duodenum and that this is not only the regulator of islet secretion, but also is a factor in insulin utilization."

As to the oral substitute for insulin to which I have referred several times, I wish to report, briefly, my personal observations on two cases of juvenile diabetes, in which I tried synthalin as an adjuvant to, not a substitute for, insulin.

Case 1.—A. H., aged 6, had diabetes of over 4 years' duration, during practically all of which time he had been on insulin therapy. A tablet of 0.010 grams of synthalin was given for two nights in succession and then omitted every third night. The patient had some manifestations of hypoglycemia about 14 hours after administration of the drug. This stopped after reduction of the morning dose of insulin. There were no gastro-intestinal disturbances.

Case 2.—S. C., aged 6, had diabetes of six months' duration, during most of which time she had been on insulin. A tablet of 0.010 gram synthalin was given every night for three nights, then skipping one night. The results were practically the same as in the first case. However, although at first there were no gastro-intestinal disturbances, this patient continued synthalin

*Read in Section on Pediatrics, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

over a longer period, and finally had to abandon the drug on account of the nausea which it produced.

It is this fear of gastro-intestinal disturbance, due to the toxicity of guanidine, the main constituent, which has kept synthalin and neosynthalin from obtaining the place in our antidiabetic armamentarium, which the Bleslau workers had hoped for.

Joslin was quoted last year as saying: "The time is ripe for something new in the diabetic line." The advances which have given the most hope of fulfilling this prophecy and which have not yet been worked out to satisfactory conclusions are the attempts at cures by surgical means and the physiological-chemical investigations of Rabinowitch and his co-workers in Montreal. To both of these I have already referred, but shall go more into detail.

Following various reports in the literature, the first being by Wilder, Allan, Power and Robertson, in the *Journal of the American Medical Association* of July 30, 1927, it is an established fact that benign or malignant tumors of the islets of the pancreas result in an overactivity of these cells, causing an hypoglemia. This is termed hyperinsulinism by Dr. Seale Harris, who did the first original work upon the subject. Following these reports, and also with the knowledge, demonstrated in dogs, that ligation of the pancreatic duct will cause an atrophy of the enzyme-secreting portion and an hypertrophy of the internally-secreting islands, and also that severing the tail from the body results in an hyperfunction of the islets situated in the tail, Dr. Geza de Takats, in conjunction with Dr. Russell M. Wilder, undertook this operation on two volunteering diabetic children. While at first it appeared that the results were going to be brilliant (as the glucose tolerance was markedly increased and the insulin dosage sharply cut), still the improvement was not permanent and Dr. de Takats remarked that until we could get at the underlying cause the operation would not prove to be of permanent curative value. Recently he has done some work in celiac ganglionectomy, adrenal denervation (recall the well-known antagonism between these glands and the pancreas), and also splanchnic nerve section, all of which are helpful. He wrote me last year:

"Bilateral splanchnic section has been done on a diabetic child and another one is going to be operated upon in the near future. * * * While I have not published the results of this operation, it is clear that this child became sensitive to insulin."

When I was in Chicago, in April, 1934, I saw one of these cases and the patient has, apparently, been markedly improved. The latest in surgery of diabetic children comes from the Mayo Clinic. In the July-August number of "Endocrinology" appears an article by Wilder, Foster & Pemberton on "Total Thyroidectomy in Diabetes Mellitus," in which they report one case operated upon with indifferent result. While in this case the "child" was rather old (26), still it strikes me that the hope of good results would be brighter in the young. This is their summary:

"Total removal of a morphologically normal thyroid gland produced a marked increase in the tolerance of a patient with severe, uncomplicated diabetes mellitus. The increase in tolerance paralleled roughly the decrease in the metabolic rate. Although the patient's tolerance was greatly improved, the remedial result was not sufficient to justify recommending the procedure as a treatment for diabetes."

In a later personal communication, Dr. Wilder advises that he has nothing, at present, to add to the article. This patient takes less insulin than formerly, but still takes it and also small doses of thyroid extract. In this connection I should like to make the observation that often our records show that juvenile diabetes is associated with thyroid enlargement. While I have not made this observation in the young, but in adults, hyperinsulinism frequently accompanies hypothyroidism.

Before leaving the subject of experimental surgery, I wish to refer briefly to the old controversy, which has recently been revived, as to whether the main factor in the etiology of diabetes mellitus is non-utilization or overproduction of glucose in the body." In other words, whether it is due more to the failure to produce insulin to utilize glucose-converted food or to the failure of the glycogenic function of the liver to store it properly.

At the Michael Reese Hospital in Chicago experimental work has convinced the investigators, for reasons too lengthy to go into details here, that the latter is the main factor and they are now bending their efforts to find some way to improve this storage function. Be that as it may, both items undoubtedly enter into the case, and until we learn what they are trying to find out, it behooves us to stick to what we have and supply the insulin deficiency!

This leads us to an explanation of what I have referred to above as late work from Montreal. Briefly, Rabinowitch and his co-workers contend that we should consider the utilization of insulin, rather than its secretion. They cite

the frequent ineffectiveness of large doses given by needle, in the presence of infection, to show that there are unknown factors in the system which either destroy the secreted insulin or so modify it as to render it inert. The partial solution, at least, of this enigma may be in the other works of these authors on an insular hormone in the duodenum:

"It would appear, from these experiments, that a substance exists in normal duodenal mucosa which has a specific stimulating effect on the islets of Langerhans; in other words, an insular hormone. This, coupled with Workman's observation (he found, in 1906, pronounced hypertrophy of duodenal mucosa in cases of diabetes which came to autopsy) introduces a new factor in its etiology. Insular failure may result from excessive stimulation of the islets by the duodenal hormone produced as a result of sugar intake over long periods. Secondly, inflammatory conditions in the duodenum may lead to a deficiency in the hormone, followed by a diminished activity in the islets themselves, resulting in an hyperglycemia."

Referring to the last suggestion, it is a common observation, in cases of jaundice, with gastro-duodenitis, to note a more or less transient glycosuria.

Coming now, to a consideration of the opposite condition of hyperinsulinism, one who has seen patients suffering from an overdose of insulin (artificial hyperinsulinism, so to speak) can hardly fail to suspect a spontaneous case, when the patient describes his symptoms. Those of us who do general diagnostic work see more of these in adults, but they do occur in pediatric practice and every case of convulsions or of near-convulsions, which occur before intake of food, should be considered as coming within this group, unless disproven. My main object in including this condition in the scope of this paper is to stress the treatment of this very unfortunate symptom-complex. It was formerly thought, and, I am sorry to state, many still think, that the therapy is the reverse of that of diabetes. Thus, these patients are loaded down with carbohydrates by mouth, by vein, and in any other way possible. Thanks to the teachings of Harris, we now have a rational basis of treatment. While it may be necessary in an emergency to relieve the condition temporarily with sugars, still the basis of securing permanent improvement is to put the patient on a high-fat-low-carbohydrate diet, to avoid the further stimulation of islet secretion. In fact, John goes a little further with this "protective therapy" by giving a small dose of insulin after each meal, so as to utilize the carbohydrate equivalent of the food intake and thereby avoid any possible stimulus to islet secretion. I have not adopted the John idea, but every case that I have treated with the restriction of carbohydrates has shown improvement. I shall cite one case of a child, from my records:

A. H., a boy of 14, was brought to me by his mother in February, 1933, with a history of having had convulsive seizures often, but at irregular intervals, for the previous four years. The boy presented a typical bromide eruption and I learned from the mother that the only thing which had helped(?) him was a patent epilepsy "cure" which, she had observed, had caused some mental haziness. Upon questioning her, I learned that these attacks always came on at about 5:00 or 6:00 a. m. and never after food. Another physician had suggested the diagnosis and had placed the patient on a high carbohydrate diet, with no improvement. I arranged a meeting with the patient early one morning, but, unfortunately, the boy was feeling unusually well that day, with no symptoms suggestive of an impending attack. The blood sugar was 0.090. I was unable to secure another sample of morning blood. I gave him a proper diet and his mother later informed me that he had shown marked improvement when he kept it, in contradistinction to the results noted after the other diet.

In closing I wish to summarize, as follows:

(1) Juvenile diabetes is a study in itself.

(2) We have a rational line of treatment for diabetes and hyperinsulinism.

(3) Much research work is being done today to improve our knowledge as to the more exact nature of these diseases to aid us in prophylaxis and therapy.

(4) Most hope, at present, seems to come from the fields of surgery and physiological chemistry.

DISCUSSION (*Abstract*)

Dr. David Green, Houston, Tex.—In the hands of the pediatrist juvenile diabetes plays a small part in private practice. No doubt the public has become aware that diabetes, in any form, is best attended by the internist or diabetic specialist. Hyperinsulinism, however, doubtless occurs in pediatric practice with much greater frequency, and our success in treating what we may always have presumed to be essential epilepsy by ketogenic diets can perhaps be explained by the fact that many of them might be hyperinsulinism pure and simple. I am sure that in our experience we have gotten excellent results with ketogenic diets in a ratio as low as three and one-half to one where we could not, in the laboratory, demonstrate ketosis. Certainly Dr. Herold's message to us today should firmly fix in our minds that in pediatric practice we should always investigate the possibility of hyperinsulinism in the study of cases characterized by convulsive seizures.

WHEN IS INSULIN DANGEROUS?*

By HERBERT HILL, M.D.,
San Antonio, Texas

Insulin today is being used more and more not only for the increasing number of diabetics, but for other conditions, as well. It is one of the greatest discoveries for the aid of humanity, yet without due regard for some dangers arising from its use it can be a detriment, rather than an aid. I realize my limitation along research lines and in physiology, but I would like to call your attention to some clinical observations which I have made in regard to some dangers of insulin and attempt to explain them on the basis of physiological and pathological facts as I understand them.

Naturally, the first question that arises is "When is insulin dangerous?" I think it is a substance that must always be used with caution, and is really dangerous in elderly people and especially in elderly diabetics with complications requiring surgical treatment, the two most common being gangrene and infection such as carbuncle. In these cases we are invariably dealing with a hyperglycemia of a varying degree. The question arises, is the hyperglycemia causing the complication, or *vice versa?* I think unquestionably the latter; that is, the high blood sugar, is a result of the gangrene or infection, and not a cause. If time will permit, a reduction of blood sugar to a lower level may be theoretically sound preoperatively, but drastic means, such as large doses of insulin, with neglect of the surgical condition, are unsafe. We must remember that, due to increased metabolism and the production of a great deal of toxic material, this hyperglycemia may be a physiological response caused by one of the glycogeneses, and interference with this natural response may not be the safest procedure. This may explain also the lack of 100 per cent action of insulin in the face of infection and gangrene. Age is a factor in determining the extent of reduction, for a person below 40 years of age will tolerate large doses of insulin much better than one older. As we shall see later, an elderly person usually requires a higher concentration of sugar in the blood for normal function than one younger.

In treating the conditions mentioned above we must not lose sight of the body as a whole, and fail to consider the changes which take place in at least three of the vital organs. First, there is developed a cirrhosis of the liver with a natural reduction in the store house for glucose, a fact which will certainly be a factor in maintaining a blood sugar level. Next, we have the same condition, to a lesser extent, possibly, existing in the kidneys, with a decided change in the threshold; that is, raising it. This allows a higher blood sugar level without glycosuria. The last and most important is the change in the heart. Here we have a definite myocardial degeneration with loss of muscle tissue and a replacement fibrosis; not only a loss of muscle fibers, but also an unhealthy, undernourished, and underfunctioning muscle, as well. It has been demonstrated that between 50 and 60 per cent of elderly diabetics have coronary disease with a decreased blood flow to the heart, while this condition is found in only 8 per cent of normal individuals.

With these facts in mind, why is insulin dangerous? This reasoning is based on two lines of thought, namely, clinical observation and pathophysiological facts.

First, clinically, I have noticed that an overdose of insulin given to an elderly diabetic is always dangerous, and frequently fatal. Again, an elderly diabetic in coma can with insulin be cleared of acetone and ketone bodies, yet die of cardiac failure with a typical cardiac death. I have in mind just now the case of a man 70 years of age with a blood sugar of 200 mg. There was a far advanced myocardial involvement, with fibrillation of coronary origin, and a small gangrenous area on the right foot. A small amount of sugar was spilling over in the urine. He was, of course, bed-fast. Rather large doses of insulin were given without insulin shock, and at postmortem there was found a rupture of the heart.

Another similar case about the same age had a gangrene of moderate degree, a blood sugar of between 300 and 400, with no apparent cardiac disturbance. Although in bed continuously for one week on large doses of insulin, he developed myocardial dysfunction, with signs of cardiac decompensation.

Joslin has reported a case of an elderly diabetic who on insulin would develop definite attacks of angina pectoris after each dose. In others who died there were found areas of recent cardiac infarction.

Second, as to the pathological physiology,

*Read in Clinical Session, Medical, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

what happens? As I see it, the following takes place in these individuals. First, as we understand it, insulin has two main functions. It causes excess glucose in the blood to be stored in the liver as glycogen (glycogenesis), and, second, it produces or increases oxidation of glycogen in the tissues, breaking it down to lactic acid, carbon dioxide and water (glycogenolysis). We give a large dose of insulin and we reduce the amount of circulating sugar or lower the blood sugar level, and at the same time decrease the glycogen content of the tissue by accelerating the glycogenolysis already speeded up by an increased metabolism resulting from the infection or gangrene. What happens to the heart? We are dealing with a partly destroyed and underfunctioning myocardium with a coronary disease and decreased blood supply. The extra amount of glucose necessary for proper function must of necessity come from an increased concentration in a decreased blood supply. The insulin having reduced this concentration, we are faced with a heart muscle with a decreased blood supply, a comparatively weak sugar concentration with a resulting starvation, weakening of the heart muscle, and frequently death.

Therefore, in a diabetic patient over 45 years of age with myocardial involvement the use of insulin is dangerous and large doses in gangrene and infection are frequently fatal.

1002 Nix Professional Building

CONTACT DERMATITIS*

A PRELIMINARY INVESTIGATION

By M. F. ENGMAN, JR., M.D.,
MORRIS MOORE, PH.D.,
and
ROY L. KILE, M.D.,
St. Louis, Missouri

One of the greatest and most fascinating problems of our generation is that peculiar property of the human body tissues of becoming sensitive to and reacting to certain chemical substances in its environment, external or internal. This hypersensitivity, upon clinical evidence, seems to be in each case specific. Specificity, therefore, as an axiom, has guided thought upon this subject, and, in some senses, limited and confused our concepts.

Man, like other animals, is in reality a parasite upon plant life. It is the plant that manufactures most of the important chemical substances that animals must have to live and function. There are the vitamins, many of the hormones, and other chemical principals, which are derived by man directly from plants or indirectly from the same source through animal food. The attention of the biological world is being called ever more frequently to the fact that chemical substances, important or even vital to man, are composed of root radicals, which are found throughout the living world, down through the animals to the plants. Physiological functions, based on these chemical principals, are often found to be similar.

The best known example I might cite is the similarity between hemoglobin and chlorophyll. Chlorophyll is often referred to as "the blood of plants." As a further example of this thought, Sir Henry Dale,[1] in an address published recently in *Science*, notes that vitamin D, which in pure crystalline form is a sterol derivative called calciferol, is very similar in chemical structure to certain sex hormones, particularly certain female sex hormones. Both of these are, in turn, related chemically to the carcinogenic principle of tar cancer. The differences between these three substances are more in detail of chemical structure than in general plan. As more and more actual knowledge is acquired, the principle of specificity and essential difference is found to be more apparent than real.

Following some such line of thought in relation to the problem of contact dermatitis, Engman, Sr., suggested a possible basis upon which the mechanism of contact dermatitis may depend. It is his conception that there exists in nature some one "root radical" which in certain chemical forms may produce, when brought into contact with the human epithelium, that peculiar reaction which we call contact dermatitis. Since in most plants the offending agent seems to be oil-soluble, possibly a lipid of some sort, it is likely that the active principle containing this radical reaches the cells of the papillary layer of the cutis through the oils of the epithelium. This hypothesis neither implies nor denies the existence in the epithelium of any substance which enters the reaction, either as a predisposing factor or as an inhibitor. Specificity may depend upon small differences in molecular structure of the active principle.

With this idea in mind, we have undertaken the study of certain plant oils which are known

*Read in Section on Dermatology and Syphilology, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

to produce contact dermatitis. Our only guide as to activity is as yet the patch test. It is our purpose to find out if possible what part of the plant oil usually contains the active principle as a first step in the study of this mechanism. Dividing the oil into fractions saponifiable and unsaponifiable seemed to us a logical first approach, so we are at present conducting the following experiment:

MATERIALS AND TECHNIC

The oils used in this work were made according to the technic outlined by Coca,[2] with a few changes that suggested themselves for economical reasons.*

The oily material extracted from the plant is a rather complex mixture, consequently it is necessary to break up these oils into fractions which may yield the active principle. The saponification procedure is the first to be considered at the present time. Because of the thermolability of the oil, a gentle method was used as follows: the oil is shaken with 10 volumes of a freshly prepared 1 per cent solution of sodium ethylate (made by dissolving 1 gram of clean sodium metal in 100 c. c. of absolute alcohol) and 10 volumes of 95 per cent alcohol, and allowed to stand overnight at room temperature.

The saponification mixture is placed in a separatory funnel and an equal volume of distilled water added. The resulting alcoholic solution (approximately 50 per cent) is shaken three times with separate quantities of petroleum ether, allowing the layers to separate completely in each extraction. The petroleum ether extracts are then combined and washed with distilled water until the water layer is basic to litmus paper. The petroleum ether extract is then carefully evaporated on the steam bath or with an electric fan, leaving the unsaponifiable fraction as residue.

The aqueous layer from the first petroleum ether extractions is carefully acidified with hydrochloric acid and re-extracted thrice with petroleum ether. The combined extracts are shaken with distilled water until there is no free acid present in the water layer. The washed extract is then drawn off into a clean flask and the petroleum ether removed by evaporation, leaving the saponifiable fraction.

Patch tests were applied to the external surface of the upper arm or to the back. When tests were to be compared, they were done on the same arm or same side of the back. Gauze was cut in squares 1 cm. in diameter and the materials were applied to it in the same amounts for each test, as well as could be done without definite quantitative determinations. This gauze was applied to the skin and covered with a piece of cellophane about 3 or 4 cm. square, and then was covered with a piece of adhesive tape.

The whole oil used in controlling the tests with the fractions was always some of the same batch of oil that had been fractionated.

CASE REPORTS

Case 1 (*No. 59169*).—A white woman, aged 38, had Rhus dermatitis. Patch tests on the left back showed:

(1) Whole ivy oil.* Result: acute dermatitis 2½ cm. in diameter in 24 hours.

(2) Unsaponifiable fraction. Result: acute dermatitis 3 cm. in diameter in 24 hours.

(3) Saponifiable fraction. Result: no reaction.

Case 2 (*No. 44144*).—A white man, aged 55, had contact dermatitis. Patch tests on the left arm showed:

(1) Whole house dust oil. Result: acute dermatitis 3½ cm. in diameter in 72 hours.

(2) Unsaponifiable fraction. Result: acute dermatitis 2½ cm. in diameter in 72 hours.

(3) Saponifiable fraction. Result: no reaction.

Case 3 (*No. 56240*).—A white man, aged 45, had angioneurotic edema. Patch tests on the left arm showed:

(1) Whole ivy oil. Result: acute dermatitis 2½ cm. in diameter in 24 hours.

(2) Unsaponifiable fraction. Result: acute dermatitis 2½ cm. in diameter in 24 hours.

(3) Saponifiable fraction. Result: no reaction.

Case 4 (*No. 58394*).—A white woman, aged 18, had a dermatitis. Patch tests on the right arm showed:

(1) Whole ivy oil. Result: acute dermatitis 2 cm. in diameter in 48 hours.

(2) Unsaponifiable fraction. Result: acute dermatitis 2½ cm. in diameter in 48 hours.

(3) Saponifiable fraction. Result: no reaction.

Case 5 (*No. 59278*).—A white woman, aged 27, had a contact dermatitis. Patch tests on the left back showed:

(1) Whole ivy oil. Result: acute dermatitis 3 cm. in diameter in 48 hours.

(2) Unsaponifiable fraction. Result: acute dermatitis 3 cm. in diameter in 48 hours.

(3) Saponifiable fraction. Result: no reaction.

Case 6 (*No. 46660*).—A white man, aged 58, had a contact dermatitis. Patch tests on the left arm showed:

(1) Whole house dust oil. Result: acute dermatitis 2½ x 4½ cm. in 48 hours.

*We are indebted to Dr. A. F. Coca for many helpful suggestions in extracting and preparing the plant oils.

*_Rhus toxicodendron_ was chosen because of the large number of susceptible individuals, as well as its prevalence in Missouri. House dust or its constituents has been found to be an occasional cause of contact dermatitis by Dr. C. M. Stroud, which he is reporting in a paper presented at this meeting.

(2) Unsaponifiable fraction. Result: acute dermatitis 3½ x 4 cm. in 48 hours.

(3) Saponifiable fraction. Result: no reaction.

Case 7 (No. 58387).—A white man, aged 57, had a contact dermatitis. Patch tests on the left arm showed:

(1) Whole ivy oil. Result: acute dermatitis 2½ cm. in diameter in 24 hours.

(2) Unsaponifiable fraction. Result: acute dermatitis 2½ cm. in diameter in 24 hours.

(3) Saponifiable fraction. Result: no reaction.

COMMENT

The number of cases studied as yet has been few, as has also the variety of oils been limited. However, our results thus far have indicated to us that the active principle is contained in the unsaponifiable fraction. In the above cases the reaction to a patch test of the unsaponifiable fraction was at least as severe as the reaction to the whole oil, and in some cases was even more marked. We feel encouraged to continue this work and plan to use other plant oils and other contact agents in this same way. We are further fractionating the unsaponifiable portion of the whole oil.

We, of course, are not prepared to interpret our results or draw any inferences or conclusions from these preliminary experiments. We consider this as a new angle offering a different approach to the complicated and little understood subject of sensitization.

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DISCUSSION (*Abstract*)

Dr. Morris Moore, St. Louis, Mo.—Dr. Engman's report is very interesting to me, because I have an active part in the work, that of preparing the oil extracts, that is, the whole oil, and the fractionation of these extracts. The work is still young and these preliminary investigations need much more confirmatory work. In order to get at the fundamental or active principle mentioned by Dr. Engman, we made use of the saponification procedure, which has been employed by chemists for some time. By this method we know that two types of oil are developed, an oil-soluble and a water-soluble portion. We further know that vitamins A and D and a number of hormones have been isolated by the saponification method, and these have been found in the non-saponifiable fraction which is oil-soluble.

In the work presented here it is quite apparent that the active principle resides in the oil-soluble or non-saponifiable fraction of the whole oil. This, of course, suggests an analogy to the vitamins and hormones isolated from this fraction, at least from the point of activity, and possibly with regard to chemistry. That, of course, remains to be seen. At the present time we are concerned with the further fractionation or breaking up of the non-saponifiable fraction and hope that we may arrive at an explanation of this problem.

Dr. M. T. Van Studdiford, New Orleans, La.—Dr. Engman has added a new angle in solving some of the problems of contact dermatitis. Lately Dr. Adams, of the Standard Oil Company of Louisiana, has reported a patient sensitive to crude oil of certain wells in one production field who was not sensitive to crude oil from other fields having a different sodium chloride content. The patient was not sensitive to refined products of either of the crude oils. It is just such exact determinations as those demonstrated in Dr. Engman's paper that will solve such cases.

CAROTENEMIA AND CAROTENODERMA*

By D. TRUETT GANDY,
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The peculiar yellowish discoloration imparted to the skin by the presence of carotene and related pigments in the circulating blood was noted long ago, but the recognition of the true nature of this phenomenon is an achievement of recent years. The exogenous origin of these pigments was established by various dietary experiments,[1] and their chemical and physiologic behavior has been worked out by Palmer.[2]

Earlier observers described a yellowing of the skin in diabetes which they regarded as being due to some metabolic disturbance incident to the disease, and called it xanthosis diabetica. Later Minkowski[3] divorced this condition from xanthomatous processes, showing that it was not concerned with lipoid metabolism, and Labbe[4] found no relationship between the depth of color in the skin and the blood cholesterol. In the light of modern knowledge it seems reasonably certain that the xanthosis diabetica of the older writers was identical with carotenemia.

During and just subsequent to the World War, particularly in the year 1919, a number of articles were written by German authors concerning cases of yellow pigmentation of the skin occurring incident to the high vegetable diet necessitated by the food shortage of that period. First suspected from spectroscopic studies, the actual presence of carotene in the blood serum was later demonstrated by chemical tests.

Hess and Myers[5] were the first to call attention to the condition in this country, proposing

*Received for publication April 10, 1935.

for it the name "carotenemia," by which it has since been known. Carotenoderma seems to me the most descriptive term for the skin pigmentation resulting from carotenemia, and logically the two should be mentioned together, as in the heading of this article. While it is known that carotenemia may exist in a subthreshold form without carotenoderma, the fact is that the former has no clinical significance without the latter.

Carotene is found chiefly in carrots, from whence it derives its name. Its fellow pigment is xanthophyll, and the two are grouped together under the general term carotenoid pigments. They are widely distributed in nature and are responsible for the yellow color of fruits and vegetables, milk and milk products, fats, and egg yolk.

While these pigments may localize in other body tissues, they show a special predisposition to mobilize in the skin. As demonstrated by microscopic studies, the two structures for which they seem to have a chemical affinity are the horny layers of the epidermis and the sebaceous glands, where they are found heavily deposited. This accounts for the intensification of color seen in the palms and soles and in the naso-labial folds in cases of carotenemia. Because the color is more marked on the exposed parts of the body, Klose[6] advanced the hypothesis that sunlight intensifies the pigmentation.

The significance of these compounds in normal and abnormal metabolism, if they have any significance, is still obscure. They are apparently nontoxic to the body, and serve no known function. Head and Johnson[7] state that there is a wide variation among species in their behavior toward these pigments. They are normal constituents of human blood, the amount depending on the diet. It is obvious that many vegetarians do not develop carotenoderma. Hess and Myers found that the blood serum may contain a concentration of carotenoids sufficient to discolor it, without staining the skin, and this was confirmed by Weidman.[8] The ability to eliminate these pigments is probably limited in some persons, but admittedly other intermediary factors must be involved. There is undoubtedly an individual variation in susceptibility both to an excess accumulation of carotene in the serum and to resultant coloring of the skin. While this susceptibility may be increased in diabetes, there is no direct evidence to support this view, and it is likely that the high incidence of carotenemia in diabetes is merely to be attributed to the dietary treatment given these patients.

The majority of cases recorded in the literature have been in children. I wish to report the case of an adult in whom I was able to corroborate the clinical diagnosis by laboratory studies.

REPORT OF CASE

L. D., a woman, aged 22, was seen in another physician's office. Pending dermatologic consultation, a tentative diagnosis of jaundice had been made, with considerable mental reservation. This alert physician also entertained the thought of carotenemia, but because of his uncertainty decided to seek counsel.

The patient was a well developed and fairly well nourished young woman, undergoing treatment for a minor gynecologic complaint, but otherwise in good general health. She presented a generalized tingeing of the cutaneous surface, of very characteristic distribution, and of a color most fittingly expressed in the term "canary yellow." The discoloration was most vivid in the regions typically invaded by carotenoderma, namely, the palms and soles and the naso-labial folds. In the palms and soles the tinting was deepest on the outer edges, a classical feature. In addition, a somewhat lighter but very distinct staining could be discerned in the following situations: the upper eyelids, the inner canthi, the ears, along the hair line of the forehead, and in areas subject to pressure, such as the garter region of the thigh, the anterior folds of the axillae, the elbows and knees, and the malleoli. The oral mucous membranes were clear, and the sclerae were normal. There were no subjective symptoms.

The patient stated that the color had appeared gradually over a period of several months, lately attracting the attention of friends. She worked in a cafeteria, where she received her meals, and because she did not care for meats, subsisted on a diet in which vegetables figured prominently. The nature of the trouble was explained to her, and when given a list of foods from which she should abstain, she exclaimed: "Why, those are the very foods I've been eating!" She was seen a few weeks later and the color had faded perceptibly. Then she moved to another city.

The urine of this patient was sugar-free. A specimen of blood was taken by venipuncture. A portion of it was allowed to clot, and in the supernatant serum a golden yellow color stood out in sharp contrast to the straw color of normal serum. Carotene was then tested for as follows: 2 c. c. of alcohol and 2 c. c. of petroleum-ether were added to 2 c. c. of the serum, and the mixture centrifuged. A colorless precipitation sank to the bottom of the test tube, and the upper layer of petroleum-ether turned yellow, showing that the pigment had passed into it. Spectroscopic examination of this extracted pigment revealed absorption bands identical with those of carotene.

COMMENT

The color of patients with pernicious anemia is not due to the carotenoid pigments, but the interesting suggestion has been made that the sallow yellow complexion commonly regarded as originating from vague liver derangement may be so explained.

Practically the only stumbling block to the recognition of carotenemia is the possibility of confounding it with disorders of the biliary sys-

tem. Aside from differences in color of the skin and of the serum in carotenoderma and in icterus, the one striking differential point is the non-involvement of the sclerae in carotenoderma. This is a cardinal sign that never fails.

In addition, the mucous membranes are clear, as contrasted with icterus. Looking further, the history of a diet high in carotenoids, the distribution of the pigment in characteristic areas, the absence of pruritus, and the absence of bile pigments and the presence of carotene in the blood serum suffice to rule out icterus and establish a diagnosis of carotenoderma beyond question.

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SOME POINTS IN EARLY DIAGNOSIS OF GASTRO-INTESTINAL CANCER*

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In the seventeenth century there lived in London a physician whose keen observations and vivid descriptions of diseases won for him the name of the English Hippocrates. To read his graphic depiction of disease convinces us even today that Thomas Sydenham deserves to rank with the famous Greek master, for he was not only great as a writer and clinician, but was also highly sensitive to that yearning for the advancement of the profession which makes any physician of more value to the sick. He once said:

"Nevertheless, I have always thought it a greater happiness to discover a certain remedy for even the slightest disease than to accumulate even the largest fortune, and whoever compasses the former I esteem not only happier, but wiser and better, too."[1]

It is with like intense desire to discover, to diagnose, that it seems to me we should approach the subject of gastro-intestinal cancer.

Many diseases run a definite course and, through the processes of nature, eventuate in cure without treatment, sometimes even in spite of it. Cancer of the gastro-intestinal tract, however, if not treated progresses usually to one end only, and that is death. Therefore, in caring for patients with this disease we should maintain an attitude of serious interest if we are to prevent the horrible tragedies which end its course.

To us there can be no question as to the importance of this attitude when in our own limited experience we see all too frequently striking examples which illustrate the need for thorough study of the patient. About two years ago we knew a patient whose tonsils were removed just twenty-six days before he died of cancer of the stomach. Because the tonsils were infected and because he was troubled with indigestion, the tonsillectomy had been done by a competent otolaryngologist. Another patient while under our observation for a period of two years developed a large carcinoma of the stomach. Numbers of times patients with cancer of the large bowel have come to us who only a short while before had been operated upon for hemorrhoids because of rectal bleeding.

The records of Riverside Hospital indicate that patients with inoperable intestinal cancer have had symptoms characteristic of this condition for from three to five years. The patients whom we have found to be operable reported having had symptoms for periods varying from four to eighteen months before they sought diagnosis and treatment. Obviously, very valuable time was lost, for as each month passed by the possibility of cure became increasingly remote.

No one will dispute the importance of the time element in the treatment of gastro-intestinal malignancy. In fact, experience teaches that the major difficulty has been delay in the discovery of the condition. Fifty years ago Billroth established the principles of gastric resection and approached perfection in his technic of removing portions of the stomach. Since his day competent surgeons have continued to follow his lead and have developed refinements of technic which have decreased the operative mortality. Nevertheless, until recently patients with cancer of the

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stomach have continued to die, even though they had submitted to surgical removal of the lesion. Reports[2] from one of the leading clinics in this country indicate that as late as 1915 mortality in cancer of the stomach continued to be practically 100 per cent. In 1934, however, the results are quite different. Cancer of the stomach and also of the intestines is cured today. The cure is partly due to improved surgical technic, but the main reason for the marked decrease in the mortality rate is found in the fact that the malignant lesions are discovered early. The improvement has been due more to diagnosis than to treatment. In order to make an early discovery of the malignant lesion it is necessary to get a definite appreciation of the evidences of its presence in the human body. It is this point in some of its aspects that I desire to discuss with you today.

The older doctors among you were probably taught, as was I, that the evidences of gastro-intestinal cancer are emaciation, tumor, obstruction with persistent vomiting, and severe hemorrhage, occurring in a person of the cancer age. Unquestionably, these signs do indicate the presence of a malignant growth, but if the patient manifests such marked symptoms as these before treatment is instituted his chance of recovery is slight.

If progress toward cure is to be made, we must through keen observation and proper evaluation of findings recognize other and earlier occurrences in the patient's health life. Seven of these which appear relatively early I should like to bring to your attention.

(1) Although alternating constipation and diarrhea are apparently contradictory evidences, yet a period of constipation, followed by one of diarrhea, is very frequently a sign of cancer of the large bowel. This occurrence should always invite suspicion. The constipation is often thought to be characteristically progressive, indicating a steady constriction of the bowel lumen, but it is, in fact, when observed by the patient, usually intermittent until the final closing off of the alimentary canal is complete.

(2) Vomiting sometimes occurs early in the progress of the growth. It likewise may, and usually does, come "in spells" a long time before a complete obstruction develops.

(3) Pain in the epigastrium or lower abdomen, which the patient usually calls "indigestion" and which may or may not be related to the taking of food, should suggest the likelihood of a serious lesion in the digestive tract.

(4) The patient often complains of a sense of fullness after eating and of distention following meals, or even at other times in the twenty-four hours. The discomfort from this distention may be referred to the epigastrium or to the lower half of the abdomen.

(5) Sometimes one of the first evidences of the disease is loss of appetite for food. Obviously, anorexia may be the result of many and varied conditions and is in no sense diagnostic, but it frequently offers a lead toward the correct solution of the patient's problem.

(6) The presence of an anemia which may be recognized by the doctor or by the patient because of paleness, or dizziness, is not an infrequent early sign of cancer, especially of the right bowel. There may be a slow bleeding which does not change the color of the stools, but it may waste the blood faster than the patient can manufacture it, and thereby cause a secondary anemia.

(7) Occasionally a patient will complain merely of weakness, which may be a very early sign of cancer and may result either from occult bleeding or from general disturbance of the digestion.

The seven evidences enumerated above, the patient himself can and frequently does observe, or they may be first noted by the physician when securing the patient's history. They are of prime significance. They may be summarized in one brief statement: any change in the gastro-intestinal life of an individual over thirty years of age may be an early sign of cancer.

If we keep ever before us the possible significance which any gastro-intestinal change whatever may have in patients of the cancer age, we shall doubtless aid in saving many lives. When a patient reports such change, the burden of proof against cancer then rests on the physician. With a knowledge of this change as a starting point, the clinician may amplify the history by eliciting information pertaining to the evidences which we have just enumerated. Should one or more of these seven evidences lead to the finding of a malignant lesion, the patient's chance of recovery is at least great enough to warrant treatment, even heroic treatment. Should it be found, however, that one or more of the four evidences which we first mentioned are already present, the prognosis is far from encouraging,

regardless of what efforts are made to bring about a cure.

With a history directing attention to the gastro-intestinal tract, an investigation may then be carried out toward a definite diagnosis. In the conduct of this examination there are three points of major importance which we desire to stress.

In the first place, it is not unusual to find in a patient with hemorrhoids a malignant tumor elsewhere in the gastro-intestinal tract. Because the patient has bleeding, and hemorrhoids are found, is no reason why there may not be bleeding from a growth higher up. A writer[3] from the Mayo clinic states that one out of four patients with cancer of the lower tract has had hemorrhoids removed before reaching that clinic. We have arrived at the practice of doing a sigmoidoscopic examination on all patients of the cancer age who come to us with hemorrhoids. Although usually included in the routine general examination, this examination may be done on the operating table just prior to the hemorrhoidectomy. It should always be done some time before the patient is finally discharged.

Secondly, an examination of the stool for blood, gross and occult, is made in all of our gastro-intestinal cases. This is a routine examination for hospital patients, but for office patients it might be overlooked if we did not make a practice of having it done for all patients with gastro-intestinal symptoms. The search for blood is such a simple procedure and gives such valuable information that it should not be omitted in examining any patient with gastro-intestinal trouble.

The third procedure which we follow in practically every gastro-intestinal case and in all such cases of the cancer age, is an x-ray study of the entire gastro-intestinal tract. The technic of this examination, of course, varies, depending upon whether the lesion may be of the lower or upper tract.

Presented in brief detail, the cases which follow illustrate some of the points considered in this paper.

Case 1.—Mrs. J. B. M., aged 57, came to us in February, 1929. She stated that following the experiences through which she passed during a storm in south Florida five months before, she had suffered a general collapse which was accompanied by indigestion and discomfort after eating. She was taken to a hospital in the State, and there it was noted that after laxatives were given blood appeared in her stool. Since she then had rather severe hemorrhoids, the loss of blood was attributed to them. A hemorrhroidectomy was decided upon and a long period of preparation followed. For some reason the patient changed her mind even after she was on the operating table and returned directly home without surgery. About one month later she came to us.

In taking her history it was found that for nine months the patient had recognized that she was growing weaker, that her appetite was not as good as formerly and that she occasionally had cramps in the epigastrium following eating. Within the year she had lost between forty and fifty pounds, and for two months had noticed a lump in the epigastrium. She could take only liquid foods with comfort, she said, as solid foods seemed not to pass out of the stomach.

On examination, the lump could be felt in the epigastrium. There was occult blood in the stool. Her hemoglobin was 67 per cent and the erythrocyte count was 3,500,000. An x-ray study was made, the films of which are shown. They present a typical picture of an intra-gastric growth. As no glands could be felt in the neck above the clavicles, we did a resection. The pathological diagnosis was adenocarcinoma of the stomach. Fortunately, despite the late discovery of the lesion, the patient is still living.

Case 2.—Mr. H. L. W., aged 40, consulted us in January, 1926, because he had anemia and catarrh. Six months previously, feeling very dizzy on arising in the morning, he consulted a physician who, recognizing the presence of anemia, gave him intramuscular treatments of iron. The dizziness continued, however, and the anemic condition did not improve. Because he had some fever at the time, a diagnosis of malaria was then made and quinine was given, but it brought no relief. A "laxative course" for intestinal parasites followed. After about a month of this varied treatment the patient had a severe attack of diarrhea accompanied by some vomiting, which was diagnosed as ptomaine poisoning. Following that attack he had periods of mild constipation accompanied by rather mild diarrhea.

When he arrived at the hospital he was very weak and pale. On examination, no mass could be felt in the abdomen. His hemoglobin was 29 per cent and the erythrocyte count was 2,552,000. The stools contained a definite amount of blood and on x-ray examination a barium enema showed a rather large defect in the right side of the colon. After the patient had been given a series of blood transfusions, an adenocarcinoma was resected. He died on the fourth operative day.

Case 3.—Miss L. B., aged 51, was a patient in October, 1927. Two days before admission she consulted a dentist. Recognizing that her gums were extremely pale, he declined to begin her dental work until she had consulted a physician. She said that for three months she had been conscious of growing tired more easily than formerly and had noticed that her skin seemed pale. For a year she had had occasional blood in her stools which varied from a light red to a very dark color, but she attributed it to hemorrhoids which had annoyed her for a number of years. During the year she had had occasional cramps in the right lower quadrant of the abdomen. Quite naturally, she ex-

plained this pain as due to adhesions, since she had undergone a pelvic operation six years previously. Although there was no definite constipation, she did take mild laxatives at times. Despite the loss of blood and the gastro-intestinal disturbances of the last year, she had gained weight yet had grown steadily paler.

The most striking feature of the physical examination was that the skin and mucous membrane had very little color. The hemoglobin was 30 per cent. There was blood in the stool and hemorrhoids of a mild degree were present. X-ray examination showed a rather extensive defect in the right colon. An adenocarcinoma was resected. The patient made a satisfactory recovery and has remained well to date.

Case 4.—Mrs. A. E. G., aged 54, came to us in June, 1930, complaining of bowel trouble which she said had been diagnosed as colitis. Since she had been constipated all her life and had had a good deal of distention at various times, she was certain that nothing of major importance had occurred in her health life, but she recalled that six months previously she had become rather severely constipated and after taking a laxative had had diarrhea for about six days. The diarrhea was accompanied by a great deal of mucus and some small streaks of blood in the stool. Since then she had several times seemed to be somewhat more constipated than usual and after taking laxatives had had rather copious stools containing mucus and blood. She had discerned that she had lost a little strength, although her weight had not changed.

Physical examination showed no masses nor undue tenderness anywhere, but disclosed two small hemorrhoids which bled on irritation. Feeling sure they were insufficient cause for the trouble, we did a sigmoidoscopic examination, which was negative. The hemoglobin was 85 per cent and there was blood in the stool. X-ray examination of the gastro-intestinal tract when carried out in the anterior-posterior position showed a normal colon. Since other findings suggested a growth in the bowel, exposures were made at different angles. They demonstrated a definite filling defect in the lower sigmoid. A resection of the sigmoid with removal of an adenocarcinoma was done. When last heard from about two years ago, the patient was still living, although there had apparently been a local recurrence.

Case 5.—Mrs. W. L. A., aged 56, came in in October, 1928, because she had had no stool for five days. She said she had taken large quantities of various laxatives and had attempted enemas, but nothing passed through the rectum. During the five-day period she had had a good deal of bleeding which she thought was due to the enema, but prior to that time she had noticed no blood from the alimentary tract. The rather acute onset of the trouble and the absence of suggestive signs in the initial delineation of her illness led to closer questioning of the patient, who then recalled that for the previous six months she had had a good deal of general abdominal distention and that for at least five months, although she had been able to get a passage with laxatives, she had noticed a definite increase in the degree of constipation.

The patient was rather a stout woman who looked toxic, but not emaciated, and she was not anemic. The stool contained blood. A barium enema was given and x-ray examination showed complete stoppage of the fluid four inches above the recto-sigmoid junction. Following a resection of the sigmoid, the patient made a satisfactory recovery and is living today.

Case 6.—Mr. St. J. M. W., aged 35, consulted us in October, 1933. He reported that he had been in excellent health until seven months before, when he began to have intermittent attacks of diarrhea. During these attacks he had from two to four loose stools daily, occasionally streaked with mucus and blood. They were accompanied by a gripping tenesmus and pain as if the lining of the rectum were raw. These attacks alternated with periods of relatively normal bowel movements. Except for a loss in weight of ten pounds, there were no other symptoms. The general physical examination, made after the patient was admitted to the hospital, was absolutely negative. The hemoglobin was 85 per cent and the leukocyte count was normal except for 4 per cent eosinophils. In the stools were mucus and microscopic blood. Thinking that the patient had a mucous colitis probably infectious in origin, we made repeated examinations for amebae and pathogenic bacilli, but none was found. He was then sent home for two weeks. When he returned, a barium meal was given and an x-ray examination made, for there had been no improvement in the symptoms. This examination revealed an obstruction of the lower sigmoid, as shown by the pictures on the screen. A sigmoidoscopic examination then disclosed a growth, a section of which gave microscopically the picture of malignancy. An excision of the rectum and lower sigmoid was done. After a prolonged convalescence the patient recovered.

Whether or not the suggestions made in this paper and illustrated by the cases cited, are of practical value in the proper handling of patients with gastro-intestinal cancer must be tested by applying them and not by consulting the books of medical instruction. When Sir Richard Blackmore asked Thomas Sydenham to recommend the best books for medical study, he replied: "Read *Don Quixote,* it's a very good book, I read it myself still." He could very well have been thinking of cancer of the gastro-intestinal tract in particular when making this reply, for even today textbooks present almost solely the late evidences of this condition. To recognize it in its early stages, we must discover evidences not usually discussed in text-books. If we emulate Sydenham's keenness of perception while we persistently seek early diagnosis of disease, we shall detect in patients of the cancer age various irregularities which at first may appear to be insignificant or at least not part of a serious disturbance but which nevertheless may be in fact early warnings of this disease.

A realization of the seriousness of gastro-intestinal cancer that stimulates us properly to evaluate its early signs and symptoms will not infrequently prove invaluable to the patient. By supplementing an intelligible, properly inter-

preted history with a thorough physical examination, a laboratory study of the stool and an x-ray study of the gastro-intestinal tract, we shall be able to make correct diagnoses sufficiently early to save from death caused by cancer many lives headed in that direction.

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CONGENITAL HYPERTROPHIC PYLORIC STENOSIS*

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Unlike many surgical procedures the accepted operation for congenital hypertrophic pyloric stenosis was accidentally discovered. While Rammstedt was doing a Fredet pyloroplasty upon one of these cases, the condition of the infant became so critical that the operation was stopped after the division of the pyloric tumor down to the mucous membrane. The abdominal wall was closed and, to the surprise of all, the infant recovered. Following this the profession rapidly accepted the Rammstedt operation as the one of choice, and as a result the mortality rate after surgery in cases of pyloric stenosis has been tremendously reduced.

Concerning the etiology of this condition little is known, but we do know that there is a spasticity as well as a hypertrophy of the pyloric muscle fibers. In addition to the pyloric hypertrophy examination in some cases has shown a definite hypertrophy of the musculature of the stomach and lower portion of the esophagus. Gastric dilatation with atony and gastritis develop secondary to the obstruction in the neglected cases. Whether the hypertrophy or spasticity of the muscle produces the symptoms, we cannot say, but we do know that the obstruction results from the increased bulk of the muscle fibers and the powerful contractions of the hypertrophic muscle. The congenital origin of the hypertrophy is now generally accepted; however, certain facts have not been satisfactorily explained. The infant is normal at birth. There is only the initial loss of weight and this is regained normally in the average time. Development starts in a normal way and continues until somewhere between the second and fourth week, when the initial signs of obstruction make their appearance. Rarely do signs appear before the second week and not often do they make their first appearance after the fourth week. It is stated that premature infants developing this condition show the first signs of it when they would have been between two and four weeks of age if born at full term. Curiously enough, the trouble very greatly predominates in breast-fed children. Males predominate over females by the ratio of eight to one, the first baby being affected in most cases. Many authors state that only the Anglo-Saxon and Scandinavian people are affected and that cases are rare in the negro race. It was my pleasure to see three cases in the colored race with the typical symptoms and operative findings.

The diagnosis of this condition is based upon the signs and symptoms of projectile vomiting, visible peristalsis, palpable pyloric tumor, loss of weight, emaciation and scanty stools, during the first few weeks of infant life. It is stated that a palpable pyloric tumor and gastric peristaltic waves in combination occur in no other condition. In many cases a tumor can be felt just above the umbilicus and to the right. This sign, however, is not consistently present. In not over 40 per cent of the cases I have examined has the tumor been palpable. From the following table a diagnosis may be made from pylorospasm, a less serious but easily confused condition:

The question of the diagnostic value of an x-ray examination is often discussed. Some authorities state that it is of no value in diagnosis. Others object to giving barium just before operation because it makes the stomach difficult to deliver, with danger of tearing the peritoneum; also because of the possibility of choking the infant with regurgitated barium. This can be obviated by the use of a nasal catheter, withdrawing the barium after the repeated fluoroscopic examination. Some reliance can be placed on the blunt rounded pyloric end of the

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PYLORIC STENOSIS	PYLOROSPASM
(1) Onset at 2 to 4 weeks, worse at 2 to 7 weeks.	(1) Onset at or soon after birth.
(2) Mostly in breast-fed males and first child. Rare in colored race.	(2) Occurs in both sexes about equally.
(3) Vomiting of projectile type occurs shortly after feeding; the vomitus consisting of stomach content, never bile stained.	(3) Vomiting not so projectile. Child regurgitates food.
(4) Poor nutrition and marked loss of weight.	(4) Nutrition fair. The weight loss not so great.
(5) Pronounced contraction waves moving from left to right.	(5) Mild or no peristaltic waves.
(6) Pyloric tumor (40 per cent palpable).	(6) No pyloric tumor.
(7) Diminished stools.	(7) Stools ample or loose.
(8) Not amenable to medical treatment as a rule.	(8) Amenable to medical treatment. (Atropine and concentrated feeding.)
(9) X-ray (60 to 80 per cent gastric retention).	(9) X-ray (less than 30 to 40 per cent retention).

stomach, as well as the amount of barium passing out of it. Some depend on an x-ray film study, stating that if there is a 50 per cent or more gastric retention at the end of four hours the case should be treated surgically. This method of examination cannot be relied upon because in most cases of spasm and stenosis, partial or complete vomiting of the contents of the stomach occurs before the four hour period elapses. In fact, at the clinic, we give these infants barium in their milk and observe them for eight to twelve hours. As yet, we have not had to use the nasal tube, as the child usually vomits the barium that does not pass on through; if not, the stomach is washed out. In the meantime fluids are given under the skin and, if necessary, whole blood from the mother or father is given into the gluteal muscles, or as transfusion. The operation is not a true emergency even if it is indicated. Time spent giving fluids and whole blood is well spent. Most of these cases come to the surgeon markedly undernourished after the medical treatment, if any has been sought, has failed. Some of these cases do yield to medical treatment, but only those where the spastic element seems to predominate. Atropine or tincture of belladonna relieves the spasticity of the sphincter so that the stomach has force enough to push the food out.

The following table gives some of the higher points in the preoperative treatment:

PREOPERATIVE TREATMENT

Parenteral fluids	Saline and glucose 200 to 500 c. c. by hyperdermoclysis in 24 hours
Whole blood	As transfusion or in gluteal muscles
Drugs	Atropine gr. 1/1500 15 min. A. C. until flush appears Phenobarbital gr. ⅛ to ¼ at times substituted or used in conjunction with atropine
Feedings	Thick cereal every 3 to 4 hours
Gastric lavage	Occasionally before feeding Before surgery if indicated

ANESTHETIC	OBJECTION
(1) Ether by drop method	Upper respiratory infection
(2) Local anesthesia	Prolongs operation; closure difficult

There should be no question of "medical versus surgical" treatment of pyloric stenosis. All cases should first be given the advantage of adequate pediatric care and no case is surgical from the very beginning.

SURGICAL METHODS

The present operation of pyloroplasty or partial pylorotomy, commonly called the Rammstedt or Fredet-Rammstedt operation, has been the result of a process of evolution. Among the first surgical procedures was devulsion of the pylorus through an opening in the stomach (Loreta). Next came the performance of posterior gastro-enterostomy, which still had a high mortality due to the high degree of technical skill and experience in infant surgery required. The next operations were pyloroplasties. One with a complete pylorotomy was recommended by Heinecke-Mikulicz. This was difficult because of the thickness, hardness and brittleness of the tumor. Later came the Fredet pyloroplasty or Rammstedt-Fredet operation, the accepted operation today.

In regard to the end results of these operations, an interesting report was made by Martha Wollstein on the autopsy findings of 28 cases of hypertrophic pyloric stenosis in which the patients had been operated upon and had died from other causes at varying periods, some

as long as two years following operation. On 23 cases in which the Fredet-Rammstedt operation had been performed the patients all showed a perfectly normal pylorus, and in 5 cases with a gastro-enterostomy the tumor formation about the ring was still apparent. Eleven years after Rammstedt operation the author, on opening up the abdomen, found a normal pylorus in one case. Why the hypertrophy leaves we cannot explain unless severing the circular layer produces rest of that muscle and atrophy.

The Fredet-Rammstedt operation itself is very simple. An incision about two inches in length is made through the upper right rectus muscle, so placed that the lower border of the liver is in the middle of the incision. This serves as a buffer after closure, helping to prevent postoperative evisceration.

The pyloric tumor is usually located by the exploring finger high up and well protected by the liver margin, which explains the difficulty in palpation before operation. It is delivered into the wound and held between the thumb and forefinger of the left hand. It is then rotated until the most anemic area is found; therefore later bleeding is a minimum.

The incision in the pylorus is made in its longitudinal axis through the serous and muscular coats down to the bulging mucosa. The scalpel is then turned over and the handle used to separate the cut circular fibers until the mucosa bulges out above the serosa. This insures an adequate lumen. Great care must be taken to avoid cutting through the mucous membrane at the duodenal end, as the pyloric muscle thins abruptly at this point. At the gastric end the muscular layers thin more gradually. There is also a cervical appearance to the pylorus as it protrudes into the duodenum, thus making it easy to go into the duodenum unless extreme care is taken. If perforation occurs the rent may easily be closed by means of a fine ligature.

If hemostasis is not obtained with hot packs a small piece of rectus muscle tacked in the incision usually controls it. When hemostasis is obtained the pylorus is dropped back behind the liver margin, no attempt being made to cover the wound with omentum.

The abdominal wound is closed by careful anatomic approximation of the layers with chromic No. 1 catgut. Several through and through silkworm gut sutures are put in and the skin closed with dermal or interrupted silkworm.

Because of the extreme friability, the extra time consumed, the danger of hemorrhage and the danger of manipulation in this area, further procedures for the sake of appearance alone seem unjustified.

The postoperative treatment is left largely in the hands of the pediatrician, but the following principles are followed:

POSTOPERATIVE TREATMENT

(1) Keep baby warm.

(2) Begin fluids by mouth 2 to 4 hours after operation. Hyperdermoclysis if necessary.

(3) Thick cereal feedings, atropine and breast milk soon after operation.

(4) Close pediatric care.

SUMMARY AND CONCLUSION

(1) We have not presented anything new, hoping only to refresh your mind concerning this important surgical condition.

(2) Diagnosis by complete history, physical examination and the x-ray is fairly easy.

(3) Attention has been called to the value of preoperative treatment.

(4) The pylorotomy of Fredet-Rammstedt is the surgical procedure of choice.

(5) The treatment is surgical, except in very mild cases.

(6) The mortality should not be over 2 to 4 per cent. The prognosis as to recurrence or latent complications is excellent. A normal pylorus remains.

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THE EFFECT OF THE KETOGENIC DIET ON INFECTIONS OF THE URINARY TRACT*

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A number of advances in medicine have been made by observers who were attacking the problems with an entirely different object in mind. In 1931, one of us (Clark) first discovered the growth-inhibiting power of the ketone bodies on certain bacteria which caused infections in the urinary tract. The initial case to which this type of therapy was applied had a long history of an urinary tract infection with the colon bacillus as the offending organism. With the idea of attacking the colon as a possible focus of this infection, Barborka, a gastro-enterologist, suggested the ketogenic diet as a means of changing the flora of the gastro-intestinal tract and at the same time increasing the acidity of the urine. To our delight, in five days the patient's distressing symptoms of frequency, urgency and nocturia were relieved, and in twelve days the organism had been entirely eliminated from the urinary tract.

Subsequent investigation and observation revealed that in addition to the increase in acidity the ketogenic diet caused to be excreted into the urine some substance which inhibited the growth of the bacteria. A year later Fuller, of London, in an excellent piece of work, came to the conclusion that *beta*-hydroxybutyric acid is the ketone body principally concerned in the bacteriostatic action. It was also recognized that this action was so weak that the infecting organism would not be entirely eliminated unless sufficient acidification of the urine were coincidental with sufficient concentration of the acid.

Before presenting the results of our experiments, we should like briefly to discuss the ketogenic diet. As usually outlined, the diet is so complicated as to necessitate hospitalization in practically all cases.

Recently Clark and Keltz presented a simplified dietary regimen which makes it possible to carry out this type of therapy in office practice. Reduced to its simplest form, the food intake for twenty-four hours consists of six eggs and 24 ounces of 40 per cent cream. The best results are obtained when this amount of cream and eggs is divided into five or six equal portions and taken at two and one-half to three hour intervals. The intake of fluids is not increased, but the patient is instructed to drink a normal amount of water. A satisfactory ketosis will usually result in two to four days.

Tests of the urine are made daily for diacetic acid and for the degree of acidity. After ketosis has been attained, microscopic examination for the infecting organisms are made each day. When these are no longer present at three consecutive examinations the diet is discontinued. In some cases it may be necessary to repeat this dietary regimen several times, particularly where the kidneys are involved in the infection.

It might be well, in describing the effect of the ketogenic diet on infections of the urinary tract, to recall to your minds definitions of a few of the terms to be used. A bacteriostatic agent is one which stops the growth of bacteria, or in other words, bacteriostasis is the prevention of the growth of bacteria. On the other hand, a bactericidal agent is one which is destructive to bacteria. The work of Helmholz and Osterberg on this subject led them to conclude that *beta*-hydroxybutyric acid in concentrations above 0.5 per cent produced a bactericidal effect if the acidity of the urine was pH 5.2 or less. From their report, however, the action was very weakly bactericidal, as in only four instances were there no organisms found after the urine had been cultured for twenty-four hours. In a number of similar experiments we have found that with the concentration of *beta*-hydroxybutyric acid which the average adult will excrete when on the ketogenic diet (0.75 per cent) and with the acidity of the urine at the average maximum which adult patients will concentrate, the effect is bacteriostatic rather than bactericidal.

That some studies might be made on the effects of ketosis, six students in the Medical School of the University of Oklahoma were placed on the ketogenic diet in February, 1934. In studying the carbon dioxide combining power, it was found that the average carbon dioxide capacity was 60.1 volumes per cent before the diet was started. After five days on the diet the average carbon dioxide capacity was 46.6 volumes per cent, with the minimum figure in one case being 42.8 volumes per cent. At the

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Table 1

A STUDY OF THE EFFECT OF THE KETOGENIC DIET ON THE CARBON DIOXIDE COMBINING POWER

Case No.	Carbon Dioxide Capacity Vol. per cent (plasma) Before Diet	Carbon Dioxide Capacity After Five Days on the Ketogenic Diet
1	61.7	49.4
2	58.	42.8
3	63.6	49.4
4	59.8	49.4
5	59.8	45.8
6	57.9	42.8

We are indebted to Miss Mary Whelan, of the Biochemistry Department of the University of Oklahoma Medical School, for the data in *Tables 1* and *II*.

same time we were able to obtain the exact concentration of the ketone bodies in the urine. From the tabulation of these figures in Table 2, it will be seen that there is a large variation in the output of ketone bodies in the urine, although the food intake of different individuals was the same. From a minimum *beta*-hydroxybutyric acid content of 0.220 grams per cent to a maximum in another individual of 0.620 grams per cent, the average in the six cases was approximately 0.40 grams per cent. With this variation, it is evident why some individuals with a urinary tract infection will obtain splendid results, while about one-third of the cases

Table 2

THE RELATION OF THE pH OF THE URINE AND THE CONCENTRATION OF THE KETONE BODIES TO BACTERIAL GROWTH

Case No.	Date	pH of	Acetone and Aceto-acetic Acid (Grams per cent)	Beta-hydroxybutyric Acid (Grams per cent)	Bacterial Growth 24 Hrs. at 37.5° C.
1	2-16	5.7	0.086	0.155	
	2-17	5.6	0.126	0.227	
	2-18	5.6	0.053	0.220	Heavy growth
2	2-16	5.3	0.022	0.134	
	2-17	5.4	0.046	0.265	Slight bacterial growth
	2-18	5.0	0.054	0.425	
3	2-16	5.3	0.025	0.165	
	2-17	5.7	0.038	0.198	Very slight bacterial growth
	2-18	5.0	0.095	0.259	
4	2-16	5.5	0.037	0.122	
	2-17	5.7	0.082	0.220	Slight bacterial growth
	2-18	4.8	0.103	0.620	
5	2-16	5.8	0.077	0.220	
	2-17	5.9	0.062	0.212	Very heavy bacterial growth
	2-18	5.8	0.112	0.362	
6	2-16	5.2	0.024	0.121	Very slight bacterial growth
	2-17	5.6	0.151	0.374	
	2-18	5.5	0.073	0.460	

to which this type of therapy is applied will not concentrate sufficient ketone bodies in the urine to produce bacteriostasis.

As was to be expected, the acidity of the urine was increased in the individuals excreting the larger amounts of ketone bodies. In six cases the acidity of the urine varied from pH 5.8 to pH 4.8, the urine with pH 4.8 being the one with the greatest concentration of *beta*-hydroxybutyric acid.

In most instances, while the concentration of the acetone and aceto-acetic acid increased with increase in the concentration of the *beta*-hydroxybutyric acid, we did find that at times this relation was not entirely constant. Again referring to *Table 2*, it will be noticed that in *Case 3* the concentration of acetone and aceto-acetic acid was 0.095 grams per cent and at the same time the *beta*-hydroxybutyric acid concentration was 0.259 grams per cent. In *Case 4*, the concentration of the acetone and aceto-acetic acid was 0.103 grams per cent, while the concentration of the *beta*-hydroxybutyric acid was more than doubled at 0.620 grams per cent. Some authorities have taken a measure of the concentration of the aceto-acetic acid and then have assumed that the concentration of the *beta*-hydroxybutyric acid was directly proportional. We wish to point out that this is not always a reliable assumption.

In *Table 2* it will be noted that the bacteriological studies fulfill the early conclusions laid down by one of us (Clark) several years ago, namely, that the bacteriostatic action is directly proportional to the concentration of the ketone bodies in the urine and the acidity of the urine. In *Cases 1* and *5* both the concentration of the *beta*-hydroxybutyric acid was below average and the acidity of the urine was pH 5.6 and pH 5.8, respectively. When these urines were incubated for twenty-four hours at a temperature of 37.5° C., a heavy growth of bacteria was obtained. In the other four instances only a slight growth of bacteria was evident following incubation. This would indicate that the urine in these four cases was decidedly bacteriostatic in action.

In a further effort to study the bacteriological side of the problem, urine with a concentration of *beta*-hydroxybutyric acid of 1.5 grams per cent* at various degrees of acidity ranging from a pH of 4.5 to a pH of 5.2 was inoculated with

*This is a considerably higher concentration than the average found in the urine of an adult on the ketogenic diet.

various species of gram-negative bacilli. In no instance was the urine bactericidal in action, but in each case where the urine was of pH 5.0 or less a bacteriostatic action was evident (see *Table 3*).

Table 3

A STUDY OF THE BACTERIAL GROWTH IN URINE WITH A *BETA*-HYDROXYBUTYRIC ACID CONTENT OF 1.5 PER CENT AT DIFFERENT DEGREES OF ACIDITY

	pH of Urine			
	4.6	4.8	5.0	5.2
B. proteus vulgaris	+	+	+	++
B. coli communis	+	++	++	++++
B. fecalis alcaligenes	+	+	++	++

In *Table 4*, the urine of a patient with a bacilluria who had been placed on the ketogenic diet for several days was studied. The aceto-acetic

Table 4

A TABULATION OF THE BACTERIAL PLATE COUNT FROM THE URINE OF A PATIENT ON THE KETOGENIC DIET

Beta-hydroxybutyric acid content 0.75 grams per cent—pH 4.8

Original Specimen			After 24 Hours' Incubation		
Undiluted	Diluted 1-10	Diluted 1-100	Undiluted	Diluted 1-10	Diluted 1-100
67	7	2	233	35	7

Patient's urine gave negative culture after 3 days, showing bacteriostatic urine will produce satisfactory clinical results.

acid test with 10 per cent ferric chloride gave a strong positive reaction. The pH of the urine was 4.8 and the *beta*-hydroxybutyric acid content was 0.75 grams per cent. The original specimen undiluted showed a plate count of the bacteria to be 67. After incubating the urine for twenty-four hours the plate count in the undiluted specimen was 233. As is evident, this showed a bacteriostatic action, but not a bactericidal action. It is of further interest that this concentration of *beta*-hydroxybutyric acid in the uine at such an acidity will produce very satisfactory clinical results. After maintaining this degree of ketosis in the patient for three days, there was no further evidence of infection clinically or microscopically.

CONCLUSIONS

(1) The effect of the ketogenic diet on infections of the urinary tract is apparently bacteriostatic.

(2) To obtain bacteriostasis sufficient to produce satisfactory clinical results, a concentration of *beta*-hydroxybutyric acid in the urine of 0.40 grams per cent must be obtained coincidental with an acidity of the urine of pH 5.2 or less.

(3) The carbon dioxide combining power (plasma) of an individual on the ketogenic diet is considerably reduced, but apparently this reduction is not dangerous.

DISCUSSION (*Abstract*)

Dr. R. S. Mallard, Fort Worth, Tex.—For a number of years, and even before I learned anything about the ketogenic diet, I prescribed a similar diet, but with an entirely different object in mind. The purpose of the diet that I prescribed at that time was to treat the intestinal tract as a focus of infection of the urinary tract. This diet excluded every article of food that contained any form of sugar, the highly seasoned meats and condiments.

Undoubtedly an extremely acid urine is bacteriostatic, and Dr. Clark has proven conclusively that the bacteriostasis is not necessarily due to the presence of beta-hydroxybutyric acid alone. This is an important fact to know, because one might keep the patient on the ketogenic diet an unnecessary length of time, trying to produce *beta*-hydroxybutyric acid in the urine in sufficient concentration for the desired result. On the other hand, one might think the diet is a failure in certain cases because this cannot be accomplished and discontinue it too soon. I believe that the degree of acidity is the bacteriostatic factor in the urine. The work of Jaoi, a Japanese research worker, and others has definitely proven that *B. coli* cannot live in a culture media with a pH of 5.2 or less. The pH is more easily lowered in some individuals than others. I have not determined the cause of this, but I believe it is due to a greater alkaline reserve in some individuals than others. This could be determined by testing the carbon dioxide combining power of the blood before starting the diet. Dr. Clark's *Table 1* shows this to be true fairly consistently in the cases that he tested, and it is a very interesting and valuable observation. This proves that some individuals will have to be kept on the diet longer than others in order to bring the urine to the desired acidity.

I ran a series of tests on seven employes at the Cook Memorial Hospital at Fort Worth, who were put on a modified form of the ketogenic diet, which permitted not more than 84 grams of carbohydrate daily, and found a pH of 5.2 or less in five of the individuals within three days, and one of these at the end of the third day showed a pH of 4.8, but none of them showed diacetic acid or acetone. Therefore, I have been prescribing a modified form of the diet which includes not more than 84 grams of carbohydrates, 60 grams of protein, and 260 grams of fat. I have found that the strict ketogenic diet as advised by Dr. Clark is very disagreeable to the patient. It is almost impossible to keep them on it unless they are hospitalized, and this is impractical in many cases. The modified diet described above produces the desired result in most cases and at the same time is more palatable and more likely to be followed. I permit the additional carbohydrates only in the form of buttermilk and a small

amount of bread. The reason for this will be explained shortly.

Although I am a firm believer in the ketogenic diet and its bacteriostatic effect on the urine, I am convinced that we are overlooking a very important therapeutic factor in the diet and that is its inhibitory effect on the bacterial growth of the intestinal tract. Dr. Clark mentioned the fact that Barborka, a gastroenterologist, suggested the ketogenic diet as a means of changing the bacterial flora of the intestinal tract. I do not believe that the diet necessarily changes the bacterial flora so much as it retards the bacterial growth. Stating it in a simple way, we might say that the ingestion of food that is a very poor culture medium inhibits their growth. Can one imagine any ordinary forms of bacteria thriving on a medium composed principally of fats? About a year ago I learned that a high fat diet does not alter the pH of the large intestine. Buttermilk is a very poor culture medium and *B. coli* cannot be cultured in it unless dextrose is added, even although the pH is raised to 7.0.

We know that the most common offender of the urinary tract is the colon bacillus, and especially cases which have a pure colon bacillus infection should be put on the ketogenic diet, because they probably have some degree of colitis or enteritis, which is the source of the urinary infection. In other words, we cut off the bacteria at their source of supply. It is a common experience to see an acute attack of pyelitis following an acute attack of diarrhea. According to the works of Hance, Arnold, Shuger, Reth and Squier, intestinal bacteria, especially in pathological conditions, invade the blood stream almost daily. Evidently, the blood stream is the most common route by which bacteria are carried to the urinary tract. Many times I have obtained positive colon bacillus blood cultures during an attack of acute pyelitis, and I believe many such cases are accompanied by or preceded by a blood stream infection, due to an invasion from the intestinal tract. It is necessary to direct our treatment to the intestinal tract as well as the urinary tract unless the focus of infection is obviously somewhere else.

Dr. Miley B. Wesson, San Francisco, Calif.—The ketogenic diet sounds simple and others have success with it, but I am not sure that I have obtained any good results. I have so much confidence, however, in Dr. Clark that I am going to continue its use as long as he recommends it. All of my hospital pyelitis cases are put on the diet, and yet it is rarely that I can get a urine with a hydrogen ion concentration below pH 5. My routine is to use the ketogenic diet for a week or ten days and then during a similar period I stop the diet and prescribe enteric coated (yellow) ammonium nitrate or ammonium chloride tablets 60 to 120 grains and methenamine grains 60 per day. The diet and urinary antiseptic are used alternately.

Dr. Henry Helmholz is very much interested in the use of *beta*-hydroxybutyric acid (1 to 2 grains per day in capsules) in the cases of patients who are showing a fair degree of ketosis. In others it merely breaks up into carbon dioxide and water. When I talked to him four months ago the difficulty he was facing was the price. The supply of the drug was limited and the cost was $15.00 per 25 grains. I should like to ask what Dr. Clark's experience has been with this preparation? Is this adjuvant proving satisfactory and has any drug house taken over the manufacture on a scale that would make its use practical?

X-RAY DIAGNOSIS OF POLYPS, CYSTS AND TUMORS OF THE NASAL SINUSES*

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The better specialists in rhinology are depending more and more on the roentgenologist for the diagnosis of conditions in the nasal accessory sinuses. In the Episcopal Ear, Nose and Throat Hospital, in Washington, District of Columbia, the writer has found that almost every case of suspected sinus disease is referred to the roentgenologic department for diagnostic study. With a difference of opinion of the rhinologists and the roentgenologists, the former will almost always accept the findings as interpreted from the films. A clinical and physical examination of the patient by the rhinologist will give valuable information from a conjectural standpoint. The rhinologist can suspect from transillumination that there is pus or secretion in the sinuses or markedly thickened walls. He is not able to recognize, however, congenital malformations or lack of development. He is only able to infer what the pathologic condition of the sinuses is by the appearance of the nasal cavities on direct inspection. For these reasons he seeks the aid of the roentgenologist.

The technic of sinus roentgenology has now reached such development that excellent detail of the nasal sinuses can be secured. The writer prefers the use of the Potter-Bucky diaphragm in making all films of the nasal sinuses and does not consider them to be of diagnostic quality unless a definite opinion can be given as to the nature of the mucous membrane in both antra, and to a large extent of the other nasal accessory sinuses. Of course, other information will be secured as to the development of the sinuses and as to whether they contain pus or fluid. The most spectacular opinion that the roentgenologist can render is the presence of mucous cysts or polyps of the mucous membrane of the sinuses. The rhinologist may suspect these findings because of mucous polyps in the nose, but these findings may be present in the nose and not in the sinuses or vice versa. Cysts or polyps are found as frequently in the antra as in the nose. They are frequently present without giving any symptoms of nasal or

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sinus difficulty. This is particularly well illustrated in a case of ours in which stereoscopic roentgenograms were made of the entire skull looking for a basal fracture. There was no fracture, but the patient had two very definite large polyps in the left antrum and one large polyp in the right antrum. He was a man of superior intelligence and insisted that he had never had any difficulty with his nose, throat or sinuses and would not consider consulting a rhinologist in regard to these polyps.

The question arises as to the possible roentgenologic differentiation of polyps and cysts. This cannot be done except by difference in morphologic appearance. If they seem to have a small neck they are reported as polyps, and if they are sessile, they are reported to be cysts. Frequently the mucous membrane of the antra is markedly thickened all over with multiple polypoid formations with one or more of larger size than the others.

Cooperation with the rhinologist is necessary to demonstrate tumors in the sinuses. The roentgenographic examination should not be done immediately following irrigation of the sinuses. Frequently fluids are left in the sinuses and since the tissue density of water and soft parts is relatively the same, small amounts of water may fill up the crevices and corners of the sinus space, preventing the demonstration of the polyps or cysts.

If the technic of making the films is of the best quality the use of iodized oil is not often indicated in making or confirming the diagnosis of polyps or cysts in the sinuses. As Proetz[1] has demonstrated, iodized oil is best used in the demonstration of the filling and emptying of the sinuses. Sometimes it can be used to outline polyps or cysts more clearly in order to convince the patient and his relatives of their presence and the need for treatment.

For the last several years there has been considerable discussion in the medical literature regarding the etiology of mucous polyps. Recently Kern and Shenck[2] have confirmed their former opinion[3] that nasal mucous polyps are allergic in their etiology. In conjunction with some rhinologists I am inclined to the same opinion with regard to the mucous polyps in the sinuses. I have seen and demonstrated, roentgenologically, several cases that have disappeared under conservative treatment, such as irrigation and aeration of the sinuses. In several cases the polyps were seen to grow smaller in roentgenograms made at intervals during the treatment. In another case, a polyp was beautifully demonstrated in the first roentgenologic examination. The rhinologist preferred to do a radical operation with complete curettement of the antrum. This large polyp had been demonstrated with plain roentgenograms and on roentgenograms made following instillation of iodized oil. A few weeks later, without any treatment, the polyp had completely disappeared, leaving a fairly normal looking antrum. Whether this will reappear is not known. There is, at least, a reasonable supposition that it will. The possibility should be borne in mind that tumors in the sinuses may be cysts with thin walls that may rupture of their own accord or may be punctured by the irrigating needle. In the case referred to above the antrum had never been punctured, except to instill the iodized oil.

Other types of true tumors, both benign and malignant, are found in these air spaces. Probably the next most frequent tumor to be differentiated is the dentigerous cyst. These cysts practically always carry a partial shell of bone ahead of them. The correct diagnosis is not often definitely made until the cyst has been excised and biopsy done. Sometimes the origin can be so positively seen to be from the alveolar ridge that their diagnosis can be mentioned. Other rare types occurring in the sinus areas are osteomas or osteochondromas. These will probably arise in definite bony structures, causing compression or deformity of the sinus space without actual invasion of the mucous membrane. The same is true of a giant-cell tumor or an epulis arising from the upper alveolar ridge. It is remarkable the amount of displacement of the sinus and the amount of growth that a tumor may have in the neighborhood of either antrum without showing any external deformity.

This is demonstrated in a case of a young man who was having difficulty with vision in his left eye. The ophthalmologist reported an entirely normal eye with normal vision and suggested a sinus examination, including a roentgenologic study. Roentgenograms showed a large, dense tumor, lateral and superior to the left antrum, displacing the lateral wall of the left antrum markedly toward the midline and causing slight elevation of the inferior bony wall of the orbit. The air space of the left antrum was considerably less than half that of the right side. In spite of the size of the tumor, there was no external evidence whatsoever. Even after we had seen the tumor in the roentgenogram we could not definitely say that the left cheek was larger than the right. The tumor was excised through a large flap incision of the cheek and found to be a benign osteochondroma. The patient's eye condition cleared up, and there were no residual effects except a

rather unsightly large scar. The tumor was about 3 cm. in diameter and was rather well walled off.

Malignant tumors of the sinuses are not particularly rare, but as in most carcinomas elsewhere, when the patient applies for help and treatment, so much damage has been done that the diagnosis is more than suspected at routine clinical examination. Roentgenograms are of exceptional value to show the area and amount of involvement and the extension to other areas. The type of tumor will usually have to be determined by biopsy after operation.

There should be more cooperation between the roentgenologist and the otolaryngologist. Most of the latter do not fully appreciate the aid that they can get from roentgenologic examinations, with a competent consultant directing the taking and the interpreting of the films. A final warning should be given. Roentgenologic work done by the otolaryngologist is not worth much to the patient and such examinations should be discouraged.

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DISCUSSION (*Abstract*)

Dr. J. A. Beals, Greenville, Miss.—In our clinic we have been interested in a kind of mucosal thickening which is not inflammatory nor allergic in origin, but seems to depend upon disturbance within the gastrointestinal tract. The degree of thickening is not great, is rather uniform and persists only so long as the digestive upset. That there is a reflex congestion of the nasal mucosa due to digestive disturbance we are convinced, and it seems only reasonable that the sinus mucosa should partake of this same congestion. The symptoms of "stuffy nose" and "postnasal catarrh" are familiar to many of us who suffer from periodic attacks of hyperacidity, especially after gross indiscretions of diet.

Dr. John T. Crebbin, Shreveport, La.—The differential diagnosis of polyps, cysts or tumors, will determine the line of treatment followed to a great extent. Possibly tumors will interest your Section more than polyps or cysts. These will doubtless be treated and operated upon by those of us who practice otolaryngology.

Formerly, many tumors were operated upon with disastrous results, whereas the Coutard method of protected fractional x-ray doses is now being used by members of your Section with wonderful success.

One should be positive of the pathological changes in the sinuses before undertaking any line of treatment. X-ray is of incalculable value in determining these changes.

The fact that there is a closer cooperation between the radiologist and the otolaryngologist is most encouraging. Working together, we shall accomplish better results in our specialties and incidentally this cooperation will redound to the good of our patients.

Dr. J. Cash King, Memphis, Tenn.—A few months ago we encountered an unusual growth in the left antrum of a white woman, 26 years of age. The x-ray diagnosis was that of bony hyperplasia of the left maxilla, resulting in complete obliteration of the antral cavity, as well as general enlargement of the external portion of this bone and similar changes in the zygoma on this side. Operation and microscopic study of the tissues resulted in a report of normal bone (not compact) occurring in the areas described in the x-ray report. This growth had not eroded the periosteum on the external portions of the bones. Postoperative infection occurred, and an alcoholic injection of the fifth nerve was necessary to relieve pain. Deep x-ray therapy was given over the affected region, using cross-fire technic.

Little or no beneficial results were obtained from the first series of treatments, but before the second series was completed a definite regression in the growth occurred and the infection subsided considerably. The patient is still far from being well, and we are at a loss to diagnose her case. I wish to ask Dr. Moore if he has encountered similar cases, and if so, what he has been able to accomplish in their treatment.

DIAGNOSIS AND TREATMENT OF SINUSITIS*

By W. Likely Simpson, M.D.,
Memphis, Tennessee

The chief aim in this discussion will be to emphasize some of the most important aids in diagnosis and treatment of sinusitis, and to bring out especially some of the operative procedures which have given satisfactory results. The different sinuses will be taken up in sequence as follows: antrum, ethmoids, sphenoids, and, finally, the frontals. In the external operative procedure the various sinuses will be grouped.

DIAGNOSIS

Whether sinus disease is present or not and the type of infection, can usually be determined by a carefully taken history. Direct inspection of the nasal cavity and examination with the indirect mirror posteriorly, give the most valuable information that is to be had in the usual case. With the long-bladed speculum pressing the middle turbinate toward the septum, a very

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good view of the region of opening of the antrum, ethmoids, sphenoids and frontals is obtained. The presence of mucus or pus, hypertrophies, edema or polypi is to be noted.

The pharyngoscope either in the nose or within the sinuses has been somewhat of a disappointment to me. Many times it has not been possible for me to determine the condition of the mucous membrane by this means, and this has been emphasized by the fact that at times in doing radical sinus surgery the external appearance of the mucous membrane did not give the true condition. Frequently what appeared to be practically, if not entirely, normal mucous membrane proved to be very thick and rather badly diseased. These facts were determined only by direct inspection, palpation, *et cetera,* and certainly not by inspection through the pharyngoscope. Of course, it is understood that a complete study can be made only with the aid of astringents such as cocaine or epinephrine.

The washing of the antrum through the inferior or middle meatus, the washing of the frontal and the sphenoid with a study of the return fluid content, the amount of discharge in the washing, and a macroscopic and microscopic study of the discharge, are important steps in the diagnosis of sinus disease. Sewell, Hansell, Kistner, Israel and many others have emphasized the importance of these procedures. The presence of eosinophils indicates an allergic reaction, while neutrophils only would usually mean an acute cold or a sinus suppuration.

Transillumination in my hands is worth very little. If a positive finding is noted it has some value, but often the negative report is misleading and gives a sense of security when a definite pathological condition is present. I do not feel that the test should be made if one is to depend on this finding to determine the presence or absence of a sinus disease.

The x-ray is by far the most important aid in diagnosis besides the inspection of the nose and study of the secretion from the sinuses. A good x-ray film with correct interpretation is a wonderful aid to the rhinologist. The rhinologist who makes or has made x-rays of his patients in his own office and who interprets his own films and correlates his x-ray with his operative findings has a better understanding of the sinus disease than anyone else. I believe that in the not far distant future an x-ray equipment will be practically as common in the rhinologist's office as in the office of the well equipped exodontist. Stereoscopic pictures are to me of much more value than flat ones, but to a Law, McMillan or Granger they may not be necessary. Opaque oils as a general thing give me very little aid in diagnosis. They are, however, convincing to the patient.

TREATMENT

Very little discussion will be given of treatment except operative procedures, including irrigation of the sinuses.

Irrigation of the antrum, either through the inferior or middle meatus, is probably done much more often than all other operative procedures on the nose. It seems to me that it is of no great importance whether the antrum is washed through the inferior or middle meatus, but of more importance is with how much care it is done. Harm may be done either way, but if proper attention is given to either method practically no complications should be encountered.

If for any reason the antrum does not irrigate after puncture with only slight pressure, the procedure should be abandoned for at least 24 hours when, as a usual thing, the normal irrigation can be made. Even if the mucous membrane of the antrum is very edematous or polypoid in 24 hours this condition usually will be corrected to such an extent that the irrigation can be carried out. I have never seen anything but good results from washing very acutely diseased antrums which need drainage, and I see no reason for not carrying out this procedure.

The anterior end of the middle turbinate is at times removed so that irrigation and suction of the frontal can be done. But unless there is a very acute ethmoiditis or frontal infection which is threatening complications, this procedure is not indicated. The removal of a part or all of the anterior ethmoid will give sufficient approach to the frontal without the removal of the anterior end of the middle turbinate. Rarely the entire removal of the middle turbinate is indicated for drainage of a very acute frontal and ethmoidal infection, especially if complications are threatening.

Simple Antrum Operation.—The opening of the antrum in the inferior meatus is often done in acute infections in this cavity. If this procedure is carefully and completely done it brings about an early end to an acute sinus infection. Many operators feel that this procedure is less painful and more satisfactory than antrum irrigation, especially in patients of a nervous type. A large opening with clean edges should be made

and trauma to the inferior turbinate should be avoided if possible.

Trauma to the inferior turbinate in little children is very difficult to avoid at times, and some authors, especially Robb, of Detroit, suggest an opening with a curved hemostat in the inferior meatus, with no attempt to obtain a permanent opening.

In the low grade infections of the antrum, with very little pathological change in the mucous membrane, the simple antrum is often all that is indicated and the results in a high percentage of cases are satisfactory. A good opening in the inferior meatus gives aeration, even though, as in the work of Hilding, it shows that drainage often does not take place through this opening. Irrigation of the antrum through a good opening in the inferior meatus, even in small children, is certainly much less of a procedure than by means of a puncture in either meatus.

The Complete Antrum Operation with Ethmoid and Sphenoid Exenteration.—The Canfield Stoermer operation on the antrum at times seems to be a good procedure, but in my hands has not been as satisfactory as the Denker or Caldwell-Luc procedures. The latter technic gives a better exposure so that all or any operative problems can be surmounted. With patients having few or no teeth, practically the entire anterior antrum wall, including the frontal recess, should be removed so that the pathological process can be thoroughly eradicated without undue traumatism. If the teeth are intact, the smaller the opening the better, but by the use of mirrors the entire mucous membrane lining can be removed. However, the operative time is much prolonged and there is usually more traumatism to the bone than if the entire anterior wall is removed.

Whether a flap of the mucous membrane of the inferior naso-antral wall is made, is to me of little consequence. A short flap over the bony ridge at the floor is probably all that should be left. Very little packing of the antrum is necessary. A small piece of iodoform gauze on the flap of the mucous membrane on the floor is usually sufficient.

If an ethmoid exenteration is indicated when the radical antrum operation is done it seems to me that the best approach to the ethmoids is through the posterior and superior angle of the antrum.

(A) *Trans-antral Ethmoid and Sphenoid Exenteration.*—Some of the anterior ethmoids can not be opened through the antrum and must be exenterated intranasally or externally. The ethmo-maxillary group of cells which are just posterior to the superior part of the antrum really can be exenterated only through the antrum, and are usually left undisturbed in the intranasal or external routes. At times an ethmo-maxillary cell is practically the same size as the antrum. By the removal of the entire wall between the antrum and this group of cells thorough drainage of this region is obtained and this area eradicated. It is, I am sure, understood that exenteration of supra-orbital ethmoids and ethmoids extending into the distant parts of the sphenoid cannot be done many times through the antrum. The sphenoid exenteration is usually quite satisfactorily carried out through this approach; this procedure being done immediately after the posterior ethmoid technic is completed. If packing is used, one piece of iodoform packed in the sphenoid, then in the ethmoid, and, finally, on the floor of the antrum upon the mucous membrane flap, is all that is necessary.

(B) *Intranasal Ethmoid and Sphenoid Exenteration.*—In intranasal ethmoid exenteration the entire labyrinth should be done if possible without undue danger to the patient. But it has been demonstrated many times that with most operators, even though it seems there has been a thorough and satisfactory exenteration, usually one or more cells are entirely overlooked, and if there are wide extensions of the ethmoid over the orbit or the wings of the sphenoid, these cells are seldom, if ever, exenterated intranasally.

In doing ethmoid surgery intranasally or externally, if the middle turbinate is in quite a good condition as a usual thing it should be left intact and generally would not interfere with the healing of the ethmoid and frontal region. In doing an intranasal ethmoid exenteration one of the greatest helps to me has been the cutting of the attachment of the anterior end of the middle turbinate with a chisel, as suggested by Halle, so that the middle turbinate can be pressed easily towards the septum and a direct view of the region of the opening of the frontal sinus can be obtained. This also facilitates the removal of the agger region, as suggested by Moshier and Halle, and other surgical procedures in this region.

The use of burrs and rasps has not been of

great help to me in frontal sinus surgery. Often the opening of the frontal again becomes obstructed, but often a thorough removal of diseased anterior ethmoid gives a satisfactory drainage of the frontal.

If the sphenoid is not to be exenterated or opened through the antrum, it can usually be treated intranasally with a satisfactory result. If it is indicated to open the sphenoid it seems to me, as a rule, that an exenteration should be done. The tying of the vessels, as suggested by Sewell, with the use of the flap of mucous membrane, is a good procedure. In those sphenoids, with a tendency to close with mucous membrane, and so on, the removal of the septum of the sphenoids and also the posterior part of the nasal septum often gives a happy result.

Acute Sinusitis with Complications.—Emphasis should be laid on the fact that drainage only should be sought in acute and fulminating sinus affections. In ethmoid and frontal infection, with complications such as orbital abscesses, periostitis, or osteomyelitis, external drainage should be obtained without any attempt to do a thorough, complete operation. If an external opening with good drainage without closure is made, the prognosis is much better than if exenteration of the frontal or ethmoid is attempted. If a thorough, complete operation is indicated this should be done when all acute infection has subsided. Usually in one to two months this procedure is safe. Many a patient has lost his life by too much surgery during the time of acute infection.

Intranasal surgery in the presence of sinus complications, as periostitis, or orbital abscess, is not so good as external drainage, and this is especially true in little children.

External Ethmo-Spheno-Frontal Surgery.—If the usual intranasal sinus surgery associated with the radical antrum has not been satisfactory, or if a very extensive, marked degree of sinus disease exists, or if there are anatomical barriers, such as very marked extension of the frontal and ethmoid sinuses, the conservative operative procedure is an external operation upon these cavities. The attempt to exenterate marked extensions of ethmoid cells intranasally is anything but conservative.

Exenteration of the ethmoid, sphenoid and frontal through an external wound through which all parts of these cavities can be thoroughly inspected with the naked eye, or by means of mirrors through which all pathological tissue can be removed with very little trauma to the bony wall of these cavities, is much more conservative than most intranasal procedures. The operation can be satisfactorily done under general anesthesia, but to me local anesthesia makes the entire procedure very much easier and safer. Scopolamine and morphine analgesia makes the approach to the procedure very much easier.

SECONDARY GLAUCOMA*

By EDWIN W. BURTON, A.B., M.D.,
University, Virginia

In my opinion there is no single disease with which the ophthalmologist has to cope that requires more skill and judgment to deal with than does secondary glaucoma. While, fortunately, unlike the primary form, it usually involves only one eye, yet I believe it is because of this very fact that so little attention, comparatively, has been given to it. Many textbooks of ophthalmology devote only a few sentences to this subject. It is not always possible to give a clear-cut and a rational method of treatment for every case, for each is a law unto itself; but, nevertheless, if one has not a thorough understanding of the pathology responsible for this condition, effective methods of treatment cannot always be employed and atrophy and excavation of the optic nerve with resulting blindness will follow just as surely as in the primary form. Therefore, it is extremely important, once the diagnosis is made, to institute promptly measures to reduce the tension and to arrest the disease.

The causes of secondary glaucoma are so well known that very little need be added here. In general, it may be said that the increased tension is the result of some pathological change within the globe: an alteration in the character of the intra-ocular secretion, the formation of anterior peripheral synechiae or annular posterior synechiae, swelling of the lens after injury, wounds of the cornea into which the iris has become incarcerated, thus blocking the filtration angle, and so on.

It is well known that when the capillaries dilate the permeability of their walls is increased

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and there is an increase in the plasmoid aqueous humor. The filtration of the aqueous is embarrassed by the presence of these colloids and increased tension results. In a recent case of iritis or irido-cyclitis the alteration in the character of the aqueous and the formation of cellular debris may be sufficient to cause an increase in tension. Probably a similar mechanism occurs in thrombosis of the central vein of the retina. In the more chronic types of secondary glaucoma the increased tension results not so much from the altered character of the aqueous as from the formation of exudates. Thus, the pupillary border of the iris may become completely adherent to the lens, preventing the passage of the intra-ocular fluids from the posterior into the anterior chamber, causing the iris to balloon forward (iris bombé), or the formation of anterior peripheral synechiae may be so extensive that the iris angle is insufficient to filter off the intra-ocular fluid as fast as it is formed, thus upsetting the normal equilibrium. The same thing occurs when the anterior chamber becomes narrowed or obliterated by a swollen lens or incarcerated iris. If, in such conditions, the iris remains in contact long enough with the posterior surface of the cornea, adhesions will form and the angle become blocked. In other words, we have in this latter instance an anatomical predisposition to the development of secondary glaucoma. In addition to these anatomical and pathological factors which are associated with the disease itself, sclerosis of the pectinate ligament must be considered as a further predisposing factor for the development of increased tension.

The diagnosis of secondary glaucoma is as a rule easily made, but at times may prove very difficult. The symptoms more or less simulate those of primary glaucoma, varying more or less with the rise in pressure, but they are frequently masked by the disease that is associated. The real problem at times is to differentiate the secondary from the primary form of the disease, and to do so may require a very careful and painstaking examination, as the following will illustrate:

Miss M. B. H., aged 20 years, was admitted to the University of Virginia Hospital on December 20, 1932, complaining of headaches, pain in the right eye and dimness of vision. The eye had never been congested. The past history was unimportant except for repeated attacks of coryza and sore throat for the past ten years. Vision in the right eye was 20/65 and in the left 20/25. Examination of the right eye revealed a steamy cornea, moderately shallow anterior chamber, and dilated pupil, which reacted sluggishly to light. There were no spots on Descemet's membrane. The vitreous was clear and the fundus was normal except for hyperemia of the disc. The left eye was similar except the signs of increased pressure were less pronounced. The tension was 65 mm. of mercury (Schiötz) in the right eye and 35 mm. in the left eye. The visual fields and blind spots were practically normal. Physical examination and serological tests were entirely negative. Miotics and hot compresses were begun, as it was thought that we were dealing with a primary glaucoma. During the next few days the tension fell slightly and on December 24, 1932, the patient was discharged and told to continue the same treatment. Three days later she returned, as the previous symptoms had recurred. On examination at this time the pupils were found to be well contracted, but the tension had risen to about the same level as on the first admission. The irides were normal, but after careful examination several small clumps of cells were found on the posterior surface of each cornea. It was clear now for the first time that a serous cyclitis was present. The miotics were discontinued and a cycloplegic was used. The pupils dilated widely without evidence of synechiae and the tension gradually fell. The clumps of cells on Descemet's, which for a while increased in numbers and arranged themselves in typical triangular formation, soon began to disappear. The tension gradually returned to normal and the vision improved to 20/20 in each eye. The patient has had no return of symptoms.

This case is interesting not only from the point of view of diagnosis, but also from that of treatment and etiology. In regard to the latter the frequent attacks of nasopharyngitis must be seriously considered. This example shows also how difficult and how at the same time important it is to diagnose correctly such cases.

There are too many types of secondary glaucoma to give any blanket description of the treatment. The measures which may benefit the disease leading to the development of secondary glaucoma frequently affect adversely the pressure, and rare judgment is sometimes necessary to maintain the proper relationship between these two factors. Particular attention should be given to the physical state of the patient. All sources of infection, whether local or general, which have a possible bearing on the disease should be corrected. Elimination should be thorough. I cannot speak too highly of the value of foreign proteins, preferably boiled milk given intramuscularly, in many of these cases. It is most gratifying to see an angry painful eye become almost quiet the day following the injection.

While acute iritis as a rule responds to the usual treatment there occasionally occurs an increase in the intra-ocular pressure. It is my opinion that if cycloplegics were used freely from the very beginning such an unpleasant complication would be less often met with. I cannot stress too much the importance of subconjunctival injections near the limbus of

epinephrine, cocaine and atropine. By this method synechiae can be broken up early, which will materially shorten the course of the disease and lessen the possibility of the development of increased tension through blocking of the filtration channels by exudate. Intragluteal milk injections are a valuable adjunct to the local treatment. If the tension is only slightly increased it has been our rule to continue the use of the cycloplegic. It would be unfortunate if at this stage, or, in fact, at any stage during the course of an acute iritis, they should be discontinued and eserine or pilocarpine substituted. Anyone who sees many eye patients is aware that this very thing does happen too often and has observed the disastrous results to vision that sometimes follow. If the intraocular tension becomes greatly increased, and if the aqueous is extremely cloudy and cellular, I should do a paracentesis of the cornea, allowing the abnormal aqueous to escape very slowly from the anterior chamber. By this method the tension is lowered temporarily, thus permitting the continuance of the cycloplegic. If found necessary, the wound may be reopened by means of the iris spatula for several consecutive days. It is usually advisable to perform the paracentesis subconjunctivally 3 mm. from the limbus, for as Weeks[1] points out, if done through the cornea, with an active or atrophic iris, unsecured by posterior synechiae, prolapse of the iris is apt to follow. A. Fuchs[2] has recently expressed himself as being opposed to paracentesis in acute iritis, yet there are some cases which seem to demand it, as the following:

M. B., colored, aged 50 years, was admitted to the University of Virginia Hospital April 22, 1933, complaining of pain and dimness of vision in the left eye. On examination the right eye was found to be normal, vision 20/20. In the left eye the classical signs of acute iritis were present. The intra-ocular tension measured 56 mm. of mercury (Schiötz) and the vision was reduced to fingers at 6 inches. In spite of intensive treatment, the tension remained high. After several paracenteses of the cornea had been done and the use of atropine had been continued, the tension gradually fell to normal, the pain subsided, the eye became perfectly quiet and vision improved to 20/20.

Mrs. F. H., aged 55 years, was admitted to the University of Virginia Hospital July 27, 1934, complaining of excruciating pain and loss of vision in the right eye. The patient was also suffering from diabetes, hypertension and nephritis. Examination of the right eye revealed on the surface of the iris several areas of brownish discoloration, undoubtedly the rubeosis diabetica iridis of Salus.[3] Tension was 105 mm. mercury, vision light perception. The fundus could not be seen. In the left eye were numerous punctate hemorrhages scattered throughout the retina. Tension was 25 mm. of mercury, vision 20/100. Paracentesis of the right cornea was performed on several occasions. Atropine was instilled freely. The iris dilated but slightly and irregularly. The pain subsided and the iris completely cleared. The tension fell materially, but as it did not return to normal, a trephine of the cornea was done with good results.

In all probability a certain amount of useful vision might have been saved if this patient had been seen earlier. Cases of acute iridocyclitis with increased tension have in the main responded to the methods of treatment outlined above. Cyclodialysis should never be performed on these cases, as the separation of an acutely inflamed ciliary body might bring about an exacerbation of the disease. In secondary glaucoma consecutive to acute exudative choroiditis, unless there is a definite involvement of the iris atropine or scopolamine should be used cautiously.

Regarding the chronic affections of the eye associated with increased tension no hard and fast rule can be given. In those cases caused by annular posterior synechiae with resultant iris bombé, an iridectomy has been in my experience usually successful in relieving the tension, though the transfixion operation in which the balloon shaped iris is punctured four times in the horizontal meridian with a small Graefe knife is advised by some. When only a part of the iris forms flat adhesions to the lens a portion may be ballooned forward and that portion which is bound fast to the lens will of course lie flat. In these instances, as A. Fuchs points out, special care must be taken to perform the iridectomy on the part of the iris which is free.

There is a large group of cases of secondary glaucoma which are caused by the mechanical or pathological blocking of the angle of the anterior chamber. Thus in traumatic cataract the swollen lens may cause almost complete obliteration of the anterior chamber. If the cortical fragments are washed out the angle again becomes free and the tension falls. When the iris and cornea remain in contact for a considerable time, either as a result of this or some other condition, adhesions may form between them and block the angle. It is in these chronic types of secondary glaucoma, particularly when the iris has become thinned or atrophic, that a filtration operation such as Elliot's suggests itself. This operation may be repeated if necessary.

No attempt has been made to discuss all types of secondary glaucoma, but rather to correlate the pathology and the treatment. There is no disease which so requires the exercise of sound judgment which can only come from a

thorough understanding of the pathological principles involved.

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DISCUSSION (*Abstract*)

Dr. Speight Jenkins, Dallas, Tex.—Comparatively little is said or written in textbooks of ophthalmology regarding this condition. The student of ophthalmology early decides that this phase of this disease is really a secondary consideration. When a case of increased tension presents itself to him it is glaucoma. Sometimes he may differentiate the type of glaucoma, but generally the disease is either congestive or non-inflammatory. The great majority of cases of increased tension fall into the above classification. Of course good results from treatment are impossible when the diagnosis has not been made. Let me here emphasize the importance of thorough complete examination of every case of increased tension. Repeated careful examinations are necessary before one may discern the underlying cause. If a pupil is easily contracted down to a pinpoint size and this tension remains plus to any marked degree, the cause of the continued increase is not due solely to the blocking of the filtration angle by the iris. Look for the secondary consideration here which must be reckoned with carefully before any good result can be obtained.

Secondary glaucoma should not be considered in the textbooks as an appendage to glaucoma or as a subdivision under the general heading of glaucoma, but should be treated and reckoned with as a separate and distinct condition. In May's newest textbook, which is an excellent book for students, more than twenty-five pages are given over to glaucoma and less than one page to secondary glaucoma. This may be taken as a fair example of the handling of this subject by the usual author.

Dr. Burton has brought to our attention by his case histories the radical treatment employed in different types of secondary glaucoma. I do not advise the average man doing eye, ear, nose and throat work to follow the example set by the essayist in his treatment of this condition. Great experience is necessary for successful differentiation of the different types of glaucoma. One should be meticulous in his examination and his diagnosis and then the treatment can be done by nearly anyone. The borderlines between primary and secondary glaucoma frequently overlap. Some primary glaucoma cases may improve under treatment or operation just so far and then be clearly seen to be a secondary type of glaucoma. After a complete change of treatment there develops a satisfactory cure. This is another reason why one should be ever alert in treatment of any form of glaucoma.

A much greater percentage of good results will follow if much time is spent on diagnosis before any radical treatment is started.

The medical or surgical procedures to be employed are of secondary importance. A good result can be obtained best by the operation most successfully done by the particular surgeon. There is some merit in nearly all the surgical procedures usually employed for this condition. The selection of the best operation for the individual case demands careful thought and success depends on the experience and judgment of the operators.

Dr. Burton (*closing*).—Each case of secondary glaucoma demands that particular type of treatment which experience has shown to be most beneficial. I have personally had better results when treating glaucoma secondary to some inflammatory process, for example, an iritis or uveitis, with the use of a mydriatic, the frequency of its use depending upon various circumstances. In these cases a miotic oftentimes will not lower the tension, but will cause a higher tension, because the diseased process which was responsible for the increased tension in the first place is not checked.

THEELIN IN THE TREATMENT OF GONOCOCCUS VAGINITIS IN CHILDREN*

By BOYD READING, M.D.,
Galveston, Texas

The promising results that have been reported since the recent publication of an article by Lewis[1] on the effects of theelin in the treatment of gonococcus vaginitis in children, prompt the report of this series of eight cases which have been treated by the method recommended by Lewis[1] and others.[2 3 4] The need for an effective treatment of gonorrhea in the immature girl is apparent when considered in the light of past therapeutic failures, and, also, because of the belief that the incidence of the disease in children is undoubtedly on the increase.

When gonococci attack the juvenile vaginal mucosa they become buried within the interstices of the epithelial cells and also in the subepithelial spaces. Because of this, treatment by local applications alone, is ordinarily unsatisfactory.

The vaginal mucous membrane of the adult is particularly resistant to the effects of gonococci, probably because of a well developed layer of cornified epithelium that covers its outer surface. Infection of the mature vaginal mucous membrane by gonococci, *per se*, is rarely encountered. Furthermore, gonococcus vaginitis in children tends to subside automatically as puberty is approached. This knowledge led to experimental work, with estrogenic substances, the ob-

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*From the Department of Pediatrics, University of Texas. Parke, Davis & Co. furnished a portion of the theelin used.

ject of which was to bring about artificially changes in the immature vaginal mucosa similar to those found in the adult. Allen[5], Lewis[1] and others demonstrated that adequate therapy with estrogenic substances is regularly followed by a definite increase in the number of epithelial layers of the juvenile vaginal mucosa, and along with this increase a layer of cornified epithelium, comparable to that of the adult, is formed. This layer of epithelium acts as a protective barrier against the invading and rapidly multiplying gonococci, and prevents reinfection. Huberman and Isrealoff[4] believe that the formation of this layer of epithelium is responsible for the success or failure of treatment. In immature female monkeys it has been shown that the number of layers of epithelium can be increased from four to eight layers in controls, to thirty or more layers after the use of ovarian hormone.[5] The cornified epithelial layer furnishes the large desquamating epithelial cell found in the secretions from the adult vagina, and after a few days of theelin therapy in the vaginal secretion of children, as well. This change is recognized by inspecting the vagina, noting the thickened appearance of the mucous membrane, and the thin milky secretion, composed of desquamating cells, that covers its surface. Smears examined at this time will show large numbers of these cells. When this change occurs the purulent discharge ceases, and the gonococci disappear. Greater amounts of theelin are necessary to produce these changes in acute than in chronic cases.

With the cessation of theelin therapy the vaginal mucous membrane involutes to its normal structure. The time required for this change is usually from four to six weeks.

No harmful effects followed the use of theelin in the eight cases here reported. In one child (L. C.) there was abdominal pain after each of the first three injections of theelin, but this was not present following the remainder of the injections. This child also had fever associated with the abdominal pain, and the abdomen was tender to palpation. There was no instance of uterine bleeding, enlargement of the breasts, nor hypertrophy of the labia. No cumulative action appeared to result from the injections of theelin. Huberman and Isrealoff[4] noted that the ovarian hormone was constantly present in the urine of children receiving amniotin, and these authors are of the opinion that the renal threshold varies in different individuals. The amount of estrogenic substance found in the urine is proportional to the intensity of the treatment.

The total amount of theelin given in our cases varied from 2,100 rat units to 6,000 rat units. In the first cases treated an aqueous solution of theelin was used and it was given in doses of 50 rat units three times a day. The injections were given intramuscularly. In the later cases theelin in oil was used in doses of 300 rat units intramuscularly three times a week until a total of 3,600 rat units had been administered. In one instance (L. C.) a total of 6,000 rat units was given. It is possible that smaller amounts of theelin would have been adequate, since most of the smears became negative after about 1,800 rat units had been injected. One patient (G. L. H.) received 2,100 rat units in the forms of theelol orally, in addition to theelin intramuscularly. Likewise, this child was the only one who received local treatment other than cleansing baths. She was given a vaginal douche of 1-5,000 potassium permanganate solution during the first three weeks of theelin therapy.

The diagnosis in these cases was made, in each instance, on finding gram-negative intra-

Table 1

SUMMARY OF EIGHT CASES

Case	Duration of Infection Before Treatment	Medication	Total Rat Units	Results
C.W.	9 mos.	theelin in oil	3600	Smears negative after 1800 R.U. followed 5 mos. No recurrence
P.J.	4 yrs.	theelin in oil	3600	Smears negative after 1500 R.U. followed 3 mos. No recurrence
G.S.	1 wk.	theelin aq. sol.	3150	Smears negative after 1500 R.U. followed 6 mos. No recurrence
G.L.H.	2 wks.	theelin aq. sol. theelol	3000 2100	Smears negative after 3800 R. U. followed 10 mos. No recurrence
C.M.C.	3 wks.	theelin in oil	3600	Smears negative after 1800 R.U. followed 1 mo. No recurrence
L.C.	3 wks.	theelin in oil	6000	Smears negative after 3300 R.U. followed 1 mo. No reccurence
K.R.	1 mo.	theelin in oil	3600	Smears negative after 1500 R.U. followed 3 mos. No recurrence
M.C.	5 mos.	theelin in oil	3600	Smears negative after 1800 R.U. followed 2 mos. No recurrence

cellular diplococci which morphologically resembled gonococci. Each child had a thick purulent vaginal discharge, or gave a history of previously having had such a discharge at the onset of the disease. Local inflammatory changes were present in all patients. No cultures were made in any of the cases. None of the children, except G. S., was confined to bed, and no restrictions were placed on their activities. The ages ranged from 4 to 8 years. In the chronic cases various forms of local treatment had been used unsuccessfully before theelin was started, while in all but one of the acute cases theelin was the only form of treatment used. In the accompanying table will be found a summary of the cases (*Table 1*).

From the results obtained it is believed that theelin, or a similar estrogenic substance, is the treatment of choice in gonococcal vaginitis in children. It is apparently safe and effective in both acute and chronic cases. For reasons not clear the chronic cases respond more promptly to treatment than do the acute infections.

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3027 Avenue R

NUTRITIONAL WORK AMONG UNDERNOURISHED SCHOOL CHILDREN*

By ELMER L. TIMMONS, M.D.,
Colorado Springs, Colorado

This work was begun 12 years ago as an experiment in our community to determine the need and whether or not it seemed worth the effort and expense.

The building and equipment, as you see, are very simple with the idea of fresh air and sunshine in abundance at all times.

The children are selected by school nurses and representatives of various other welfare agencies. Only children having no chronic or contagious diseases are accepted between ages of 6 and 12 years. They are selected from the poorer families where the need is greatest.

First, we have a thorough social investigation, followed by mental test and complete physical examination, including blood, heart, chest, x-ray, teeth, tonsils, glands, vision and urine.

The daily routine in the camp is about as follows: Up at 7 a.m., mild exercise for 30 minutes before breakfast, including bed-making, cleaning lockers, after which they have a simple breakfast, consisting of fruit, cereal, toast, butter, bacon or eggs, and milk.

They have their school work during the forenoon, with glass of milk mid-morning. This is followed by one hour of rest, including sun bath and 30 minutes rest in bed before luncheon.

Their luncheon consists of a simple roast or stew, with two green vegetables, rye bread, butter, milk and a simple dessert.

Immediately after luncheon they have two hours rest in bed, followed by outdoor exercise, with half hour of rest before supper.

For supper they have vegetable, whole wheat bread, butter, small piece of meat or hard-boiled egg, with fruit for dessert, and glass of milk. Then quiet play until bedtime, at 7 p.m.

Of course, the most common conditions found are bad tonsils, adenoids, enuresis, bad eating habits, poor contact with fellows, and fatigue posture.

They have routine medical care, with correction of physical defects, wear sun suits practically all the time, and must obey the general rules of the institution.

The immediate results are gain in weight, greater ability to concentrate on class work, more pleasant relations with others, not only a happier child but one whose general conduct, habits and manners are improved marvelously.

The old adage, "An ounce of prevention is worth a pound of cure," applies to nutritional work among school children.

The public must be educated on the fundamentals of child welfare. School strain and fatigue must cease. The child must know of his body, mind, health and development.

Of course, as you see from illustrations the fatigue posture disappears and we have a robust physically-fit, obedient, efficient pleasant youngster, which gives us a finer child in school and home, and this in turn makes a much-improved human being and more valuable future citizen.

6 South Tejon Street

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INFANTILE PHYSIO-PATHOLOGY*

By EUSEBIO GUAJARDO, M.D.,
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Only about a quarter of a century ago did pediatrics begin to be considered seriously as a special and important branch of medical science. Diseases, especially during the first year of an infant's life, present characteristics of such a particular nature and distinct aspect that the appearance of pathological phenomena differing from those found in an adult brought about the creation of a specialized study of the diseases of children.

At the Second International Congress of Child Welfare, held in Brussels in 1921, at which convention I had the honor of representing my country, it was suggested that no physician upon graduation should be permitted to accept child or infant patients unless he had practiced pediatrics in a children's hospital for a period of at least one year.

It might be tolerable that a surgeon who has not had practical training in some of the higher branches of surgery undertake to perform a gastro-enterostomy, but it would be censurable that a physician should be incapable of pronouncing a differential diagnosis of the persistent vomiting of a new born baby or of determining the proper diet for the artificial feeding of a child. Hence, the greater attention to the development of pediatric clinics in some of the medical schools during the last ten years, although some schools have not yet attached due importance to this. It is deplorable, however, that in the teaching of pediatrics, as far as I have observed, very little or no importance has been given to the study of infantile physio-pathology.

What does infantile physio-pathology cover? A brief description of the condition of an infant's organism during its fetal life and of the transformations that take place from the time of its birth until the different parts of its system have reached the stage of full development will outline clearly what infantile physio-pathology embraces.

An infant at birth has eyes but cannot see, ears but cannot hear, its brain, greatly developed in proportion to the size of its body, acts on a very insignificant plane for the first days of life. It remains for the medullar nervous system to take care of the reactions of its general nervous system.

During the first few days of life an infant does not attain its individuality, psychic life does not exist, everything seems to center upon its digestive organs, still incompletely developed, and it is precisely upon these organs that the investigations should be concentrated. A careful and complete examination should be conducted in order to determine whether or not its organs have completed their evolution, reached the degree of development and are in a condition to justify pronouncing it a healthy baby. The period between the completion of fetal life and the full development of an infant's organism constitutes the field for infantile physio-pathology, which period does not seem to be exactly defined as yet. However, the limit of this period of transition is to be discovered in the digestive organs. It is not at all surprising, therefore, that in the study of modern pediatrics more and more attention is being devoted to and greater importance laid upon the infant's food during the first months of life.

Of the many cases that might be cited of digestive disturbances of the new born infant due to incomplete development of its organs, I wish to mention the persistent vomiting which generally appears at the end of the third week of life, rarely before then, which has been interpreted in various ways and to which different pathognomonic suppositions have been attributed. It presents a clinical syndrome that may be summarized as follows: vomitus, immediately after feeding, is ejected impulsively and is of an unmistakable nature (quite different from simple regurgitation characterized by the slow escape of food from the corners of the mouth), the infant is then constipated, becomes thin and, in short, there are profound physiological disturbances.

In explaining the clinical syndrome to which I have just referred, anatomists express the opinion that the pneumogastric nerve, the phrenic nerve, the pyramidal columns of the medulla oblongata and even the sympathetic nervous system are not fully developed and therefore are incapable of exerting a regulating and effective influence upon the function of the infant's digestive organs, which are its fundamental source of health and development during the first few months of its life.

The truth of this becomes more convincing

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when, upon treating an infant under rational therapy, even if it should be symptomatic, combating the principal symptom, vomiting, after the third month all the symptoms of the clinical syndrome described disappear automatically, due, unquestionably, to the disappearance of the unstable and unbalanced state of the various nerve centers aforementioned.

The medicament *par excellence* that produces a marked and positive improvement in the unbalanced function of the nerve centers mentioned before and at the same time the best regulating medium that I know of is atropine, given in very carefully determined doses, according to the infant's weight, age and constitution.

If, after the third month of the infant's life, these symptoms do not disappear, the hypertrophy of the pylorus accompanied by violent spasms, which in the majority of cases is attributable to syphilis, should be borne in mind.

CONCLUSIONS

(1) The period between the completion of fetal life and the full development of an infant's organism constitutes the field for infantile physio-pathology.

(2) The duration of this period does not seem to be clearly defined as yet, but in the digestive organs its limit can be found.

(3) It might be advisable to recommend that the study of infantile physio-pathology be incorporated in courses on modern pediatrics.

(4) The persistent vomiting of a new born infant, mentioned as one of the many cases pertaining to the study of infantile physio-pathology, is acknowledged as originating from the incomplete development of the various nerve centers enumerated in this paper. Therefore, these nerve centers are not capable of imparting an efficient regulating influence upon the very important function of the digestive organs.

(5) The equilibrium of the action of the nerve centers mentioned is established generally ninety days after birth and automatically all the symptoms of persistent vomiting vanish at this time.

(6) If, after the third month of life has elapsed, the symptoms have not disappeared, it is always pertinent to bear in mind those hypertrophies of the pylorus accompanied by spasmodic vomiting which, in the majority of cases, may be traced to a syphilitic origin.

A TREATMENT FOR NEUROPSYCHIATRIC SYNDROMES EMPLOYING "TWILIGHT NARCOSIS"*

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This discussion on which I am entering applies especially to functional disorders of the brain, but might be considered *á propos* for some early stages of organic disorders involving directly or secondarily the central nervous system. The field of usefulness may be expanded feasibly in the future.

May I call your attention to some statistics bearing on this subject? Possibly our time should not be utilized in calling to the attention of this group of physicians having a particular interest in diseases of the nervous system, the importance of functional neuropsychiatric disorders. A very large percentage of all patients consulting a physician have primarily one of many possible disturbances of the nervous system, and a large number at the outset are diagnosed as functional. For the year 1933 the total number of all hospital beds in the United States registered 1,027,046. Almost half of these, 498,955, were occupied by mental patients, of which the great majority were sent to the various charitable federal and state institutions for the insane. The total patient days in all hospitals of this country registered 296,000,000. Of this number, more than 68 per cent involved those in mental institutions, and slightly less than 29 per cent general hospitals.[1] You can readily figure for yourself the enormous loss of man time, to say nothing of the tremendous private and public financial burden which this entails. You are probably fully aware of the fact that a big percentage of such patients continue to occupy these beds as incurables for a full life time. This medical state of affairs should appeal to the public as an appalling catastrophe. Accordingly if we can prevent any number of such cases from becoming government charges, we shall have performed a professional and civic duty towards these various individual patients, not to mention the great saving to tax payers. I firmly believe that if many of these men and women were treated properly in the early ambulatory stage, the confinement

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to an institution could be avoided permanently for a large number.

It is important to obtain a careful history for each patient, as well as to make painstaking physical, laboratory, neural and mental examinations. The treatment to be discussed usually should not be decided upon until the individual has been observed for a number of days. Especially is the treatment indicated for many of the stubborn neuroses, anxiety states, obsessions, psychoneuroses, certain manic-depressive psychoses and possibly some of the so-called schizophrenias. We have in mind some of the major psychoses such as manic-depressive and schizophrenias as terminal states, that then may present pathological changes in the nerve cells, fibers and other structures of the central nervous system, while in the early stages they might be classed as purely functional. Possibly even some of these psychotic states with a defective or a badly loaded heredity may be amenable to a restoration if treated in an earlier period of the illness.

For many years past, some of these disorders have been treated by suggestive therapeutics of one kind or another, besides actual hypnosis. But a very large percentage of the patients were totally refractory to any of these various forms of suggestive therapeutics, because of a strong psychic fixation of the phobias and obsessions or mental inaccessibility.

During the past few years, I have had in mind for these patients, weakening or overcoming the will power by some kind of a medical hypnosis or deep narcosis employing one of several valuable drugs. About ten years ago and for a number of years afterward I employed morphine and hyoscine, using enough to render the patient unconscious but still retaining some of the reflexes. Suggestions to overcome some of the mental errors or obsessions were made as firmly as possible when the patient was about to enter the unconscious state, during the depth of the narcosis, and when consciousness was returning.

There has been a rapidly increasing use of the many compounds of the barbital group during the past thirty years. A number of the sodium salts of derivatives of barbituric acid have been synthesized so they can be used intravenously with safety. The first to appear on the market for clinical use was diethylmalonylurea (veronal) having a chemical formula of $(C_2H_5)_2$ C $(CONH)_2$ CO. This was first prepared and placed at the disposal of the practicing physicians by E. Fischer and von Mering[2] in 1903. Phenylethyl barbituric acid, phenobarbital (luminal) appeared for clinical use about 1912. Diallyl barbituric acid (dial) was available by 1914. A mixture of the latter with veronal marketed in 1920 under the name of somnifene was praised especially by the French anesthetists and surgeons as an anesthetic for many surgical operations. The work of Bardet and Daniel[3] and Fredet and Perlis[4] may be cited. There has been a feverish activity among the chemists during the past fifteen years to develop new derivatives of the barbituric acid series that may be more potent as sedatives or anesthetics having a minimum of toxicity; and in particular does this apply to preparations that can be used intravenously with success. Quite a few have been given clinical trials. Shonle and Moment[5] in January, 1923, published the result of their chemical researches with a large number of barbituric acid preparations. They found of the di-alkyl derivatives that iso-amylethyl barbituric acid (amytal) was the most active in its hypnotic property and that it carried a low degree of toxicity. Page and Irvine,[6] later in the same year, published their animal experimentations with this preparation, thus establishing the dosage. During 1926, Page and Caryllos[7] put out some further research reports. It was found that the sodium salt of iso-amylethyl barbituric acid with a slight degree of alkalinity could be used safely for an intravenous injection, and that the hermetically sealed dry salt was preserved indefinitely. Zerfas, McCallum, Shonle, Swanson, Scott and Clowes[8] have furnished us some valuable reports relative to its indications, methods and clinical application. Accordingly today, physicians have conveniently available this valuable preparation to inject directly into the blood stream. The dry salt in several dosages is marketed, one ampoule in a package, with another ampoule of an appropriate quantity of sterile distilled water to make a 10 per cent solution. The contents of the two ampoules are mixed immediately before using. In dogs it has been found that 0.010 to 0.025 grams per kilo by the stomach produced a hypnotic state within one to three hours, which lasted 18 to 24 hours.

Evipan, another recent barbituric acid derivative, has been proclaimed with enthusiasm by German and English investigators and surgeons. For our work in neuropsychiatry a narcosis from a single intravenous injection is too short, namely, in the neighborhood of 15 to 20 minutes. Also, the patient passes into the unconscious state too rapidly. Its most attractive feature is the low toxicity.

For my work to produce twilight narcosis to aid in suggestive therapeutics, I have used during the past four years almost exclusively sodium iso-amylethyl barbiturate by the intravenous method. The amount for each treatment has usually ranged from 0.5 to 1.5 grams, the dosage depending upon the physical state, sex, individual sensibility, and possibly a few other factors. The preparation should be injected slowly covering a period of about ten minutes, but the first 2 or 3 c. c. may be introduced quite rapidly. Susceptibility or allergy may be tested for by giving the patient a dose a few days in advance, or especially a moderate dose in the evening before the day of the treatment, and another dose *per os* about one hour before the intravenous injection. As a rule the patient goes under quietly. Occasionally there is some evidence of a little delirium, muscular twitchings or irregular movements preceding the unconscious state. Possibly the degree of unconsciousness desired may be open to argument. I like to have at least one or two of the reflexes retained. Certainly we do not need an anesthesia for neuropsychiatric work, such as is used by surgeons for major operations. Sodium iso-amylethyl barbiturate, given intravenously, has been used by surgeons and obstetricians for deep anesthesia quite freely during the past five years. Lundy and Osterberg[9] have written extensively relative to the surgical anesthetic indications and methods for the intravenous use of sodium amytal. A competent nurse should be with the patient continuously during the entire time of narcosis. There is some danger of the tongue dropping back and obstructing respiration unless the patient is guarded constantly. The patient can rest on the back or either side. The pulse rate is lowered, but especially is the blood pressure reduced some 20 to 30 mm. (Hg.). Metabolism is altered but little. It has been suggested if any embarrassment happened to vital functions, caffeine and ephedrin should be used subcutaneously to counteract this trouble. Thus far I have never found it necessary to use any stimulation. A few of the patients will come out of the narcosis with some loquaciousness or even a mild delirium, all of which subsides rather promptly and without great inconvenience. In a day or two following the treatment little or no residuals are to be noted.

Perhaps it is incorrect to use the term "twilight narcosis" in that we allow some of the patients to enter into even a deeper state of hypnosis. By the slow injection of the fluid into the veins we can control pretty well the degree. Some would locate the sleep center in the hypothalamus, also the neighboring central ganglia. Isenberger[10] suggests the hypothalamus as the sleep center, and the one especially involved in this narcosis. Keeser[11] indicates somnolent centers in the brain, especially for sedatives. Additional information relative to the function of sleep has been furnished in studies of acute encephalitis during the last few years. However, it seems to us that some kind of functional, if not biochemical, change takes place in most nerve cells, in all of the cerebral centers, and short association pathways; but also granting that some of the central ganglia are involved to a greater degree compared with other centers of the cerebrum. Fortunately it has been shown by animal experimentation that no permanent damage happens to any of the neural centers after an amytal narcosis in the degree of a twilight sleep state or even deeper anesthesia. The test holds for repeated demonstrations or in a series of such treatments with proper intervals.

The important part of this treatment is to make appropriate suggestions and to do so at the proper time. Several questions may be asked relative to this mechanism. Where are the impressions most readily received? It seems that this happens just about the time the patient is verging on the unconscious state, possibly even when he can mutter incoherently a few words. Another most favorable stage for making the suggestions is a little before the patient has returned to consciousness and when he is merging into a state capable of uttering a few words. Can the subconscious mind comprehend and retain for the waking state suggestions made during the rather deeper part of the narcosis, when possibly all or nearly all of the reflexes have been abolished and when a painful stimulation will elicit little or no defensive movements? This is difficult to prove for the affirmative, but I am inclined to believe that deeper mental levels in certain degrees of unconsciousness can receive instructions or suggestions while higher levels are completely submerged in the narcosis.

Twilight or deeper narcosis as an aid in the diagnosis of mental disorders has been employed for several years past. In psychotic states with functional manifestations a study of complexes, abnormal mental trends or disturbing factors may be analyzed. The use of sodium iso-amylethyl barbiturate by the intravenous route has given some good results in the treatment of catatonic, manic and stuporous states. Espe-

cially have good reports been made along this line by Bleckwenn,[12] Lorenz,[13] Lindermann[14] and others. Claude and Baruk[15] and Murray and Burns[16] employ somnifene and sodium amytal to obtain information relative to mental mechanisms with good results in several of the psychoses. Certainly it places the patient better *en rapport*.

Among my patients, two have been selected in an abstracted report to illustrate this method of treatment.

Case 1.—H. J., a middle-aged married man with four healthy children, was referred to me by Dr. Twymann in the spring of 1932. Part of the time he was in a hospital, but it was necessary to confine him to a sanitarium for a portion of the treatment. The man had a previous history of fairly good physical health. Especially had he worried over financial matters following the Wall Street crash in the fall of 1929. His sleep was greatly impaired and he exhibited much mental excitement, was delusional and hypochondriacal. Several visceral phobias were quite annoying, which at times kept him from eating adequately. In April, 1932, following about three weeks of observation and medical care, the patient was given suggestive therapy employing twilight narcosis. On the evening previous to the treatment in April, 1932, three grains of sodium iso-amylethyl barbiturate were administered by mouth, and in the morning and noon of the following day a similar dose was given. At 3:00 o'clock in the afternoon 0.4 grams of sodium iso-amylethyl barbiturate in a 10 per cent solution was administered intravenously. A state of narcosis was established so the patient was unable to talk, but retained several important reflexes and evidenced some defensive movements with painful stimuli. While he was becoming unconscious and during the recovery, appropriate suggestive therapy was employed. Especially was he strongly impressed with (1) the hope of full recovery; (2) that he had no intestinal disease; (3) that his testicles were normal; (4) that there was no permanent damage to his brain functions; (5) that his strength would return fully. Twelve days after the first, the second twilight narcosis with suggestive therapeusis was employed. On the morning of the treatment, 3 grains of the same barbiturate were given by mouth and at noon 6 grains. The intravenous injection of 0.5 grams was begun at 3:00 p. m. Thirteen minutes were employed for the total quantity to be injected. He was drowsy and yawning in five minutes; this condition changing quickly into one of stupor and to the completely unconscious state in fifteen minutes, at which time he was unable to talk. Some deep reflexes were obtainable. His systolic blood pressure was reduced 20 points. On May 12 the patient was discharged from the sanitarium. At that time he was competent to take care of himself and free from any annoying features of the depression. He continued somewhat hypochondriacal for a few weeks. After resting at a springs resort six weeks he returned home again to engage in business, which now has been carried on for two years. He has continued to remain in good physical and mental health.

Case 2.—R. N. D., a woman, aged 39, divorced five years, and possessed of one healthy daughter, aged 20, had had a normal pregnancy and no history or evidence of venereal diseases. There is a neuropathic family history. The patient consulted me in May, 1932, with the history of a psychoneurotic illness of about five and a half months' duration. She was possessed with various regrets for her past life, was unable to adjust herself to her present situation, regretted having divorced her husband, feared "going crazy" or that she might be sent to an asylum, and feared that the daughter might develop the same illness from which she was suffering. The patient attempted to injure herself on several occasions and was definitely suicidal. The family was warned and strongly urged to confine the patient to an institution for her self-protection. In a state of great agitation she eluded her nurse and jumped out of a third story window. There was some intracranial concussion, but no skull fractures, internal abdominal injuries, a fracture of the twelfth dorsal vertebral body with a little displacement, a fracture of the right fibula and tibia near the ankle joint, and numerous bruises on the body and extremities. After much shock she made a recovery with some deformity and impaired function of the ankle joint and spinal column involved. Following this injury, confinement to a sanitarium was made, where she exhibited a striking depressive and agitated state with extreme suicidal desires, and most foul and abusive language.

She was given a twilight narcosis treatment on January 3, 1934. Two fair sized doses of amytal *per os* were given as a preliminary on the day of treatment. At 3:00 p. m. she was given 0.7 grams of sodium iso-amylethyl barbiturate intravenously. She returned to partial consciousness in 2½ hours, but fell asleep again for another hour and a half. Following that she was quite nauseated and agitated for some seven hours. On January 6, similar therapeusis was carried out, using 0.8 grams of the preparation over a period of eight minutes. She was deeply under the influence for eight hours. Appropriate suggestions were given while she was going under the anesthetic and while she was coming out during each of the above treatments. Another treatment was given on January 11, 1934, using 9 c. c. of the 10 per cent solution. There was a repetition on January 26, 1934, employing 0.8 grams of the same barbiturate. After four hours of narcosis she gradually returned to consciousness with thick speech and some delirium. Not a great deal of improvement had been noted until after this treatment, when she began to improve rapidly. On January 30, 1934, another treatment was administered, at which time 0.9 grams of the barbiturate was introduced intravenously. Again it was employed on February 20, 1934. Following this an even more rapid, favorable progress was noted and she soon was considered in a normal mental state with good insight and full responsibility for her conduct. A continued rapid improvement ensued with no more treatments indicated. During the past five months the patient has been getting around with some difficulty on account of the leg and spinal cord deformities with impaired function, but does a considerable amount of work soliciting orders, *et cetera*. She can be considered as restored.

The two cases just reported will give a fairly good general idea of the method of this treatment. A number of other cases could be reported, but many would be largely a repetition. It may not be necessary to suggest that the patients to be handled in this manner should be carefully selected after an adequate diagnosis

has been made. Certain types of individuals offer a much better possibility for restoration than others. Furthermore, the early stage of any of them is a more favorable time. A patient treated eight years ago is illustrative of this warning.

This young woman had been ill several years, having been in sanitariums about three years. Nevertheless, she was given a series of suggestive therapeutics under twilight narcosis, a number of times, at appropriate intervals. Her improvement was slow, but continuous. A dual diagnosis for this case seems to be appropriate. There was a definite history of undiagnosed encephalitis a few years before the onset of psychotic manifestations. There was also some mild psychoneurotic heredity. She has improved vastly, but as yet is not capable of standing alone or even being at large in this competitive world. Her prospects for further improvement may have almost reached the limit now. Previously she had been diagnosed as schizophrenia alone, which I consider incorrect or at least inadequate. Seemingly the long-continued severe psychotic disturbance in the early stage has left a certain amount of permanent damage to many cerebral nerve cells and fibers.

SUMMARY

(1) Your knowledge of the frequency of mental and nervous disorders is taken for granted. Many of a number of varieties seem to be definitely functional, especially in the earlier stages.

(2) An adequate diagnosis as a preliminary to suggestive therapeutics under twilight narcosis is important. The time required for this may consume a few days to a month or even longer.

(3) Among the many available preparations which might be considered for a controlled narcosis, sodium iso-amylethyl barbiturate has proven to be the most satisfactory. It is not too difficult to administer. Any degree of a prompt state of narcosis can be established and readily controlled. Very few dangers are present and they can be guarded against usually. It has a low toxicity.

(4) Many clinical trials with various chemicals used intravenously are on record. The development of better preparations in the future is quite within the realm of possibility.

(5) The important feature of this therapeutic procedure is an intimate knowledge of the mental aberrations or obsessions to be corrected; then to proceed to apply forceful suggestions for each one at the proper stage of the narcosis.

(6) A number of psychiatric and neurological disorders have been selected for these treatments. Possibly the field may be broadened in the future. The result has been exceedingly encouraging with many full restorations that could be reported.

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DISCUSSION (*Abstract*)

Dr. Arthur J. Schwenkenberg, Dallas, Tex.—I have employed intravenous iso-amylethyl barbituric acid for several years since it was first called to my attention by Dr. William J. Bleckwenn at the Detroit meeting of the American Medical Association. Dr. Skoog's observations have been quite similar to mine. I have found the drug quite valuable in different excited psychoses when several hours of deep sleep were desired. It has produced quite interesting reactions in some cases of catatonic praecox. In one case I gave sixteen consecutive 1 gram doses over a period of three weeks. Shortly after, the patient made a spontaneous recovery, but two years after this remission she had a return and was committed to a state institution. I cannot help but feel that the reaction is quite different in the schizophrenias from that of the manic-depressive cases. In the schizophrenias there is a rapid release of many of the psychotic symptoms, while in the manic-depressive cases the symptoms became more accentuated. I have also noted the effect in cases of psychasthenia, where the compulsions disappear while the patient is under the influence of the drug. These observations, of course, are always made during the period when the drug is being administered very dilutely and very slowly, prior to complete narcosis. I have given other patients 1 gram doses in 20 c. c. of water so slowly that sleep did not follow.

I have used it in two cases of amnesia. In one case the amnesia was of three days' duration and in the other six months. One gram was administered in each case with 20 c. c. of distilled water and given very

slowly. As narcosis gradually took effect, association stimuli were given. In each case after the patient slept for a while and was then aroused, his amnesia had disappeared. The three-day case was that of a young man who, just before he went to sleep, stated that his father was a physician in a near-by city. After verifying this in the Medical Directory, we telephoned the father, who reached the hospital about four hours later. When the boy was first aroused, he did not recognize his father, but went back to sleep for another hour and upon awaking recognized his father and was perfectly normal.

Dr. Skoog (closing).—As with most therapeutic methods, there are some cases which seemingly are good prospects for successful treatment, but which do not respond as hoped for. A number of other cases, including different types of neural and psychiatric disorders, have responded in a very gratifying manner. As a final warning, I should like to emphasize in particular the advisability of studying the patient adequately before beginning the treatment. It is important not only to determine what line of suggestions may be indicated, but also to eliminate a few cases involving too much of a risk for a deep hypnosis with sodium iso-amyl-ethyl barbiturate or any other narcotic preparation. I have never had any alarming manifestations during or following any intravenous injections of sodium iso-amyl-ethyl barbiturate.

THE PELLAGRA PROBLEM IN THE SOUTH*

By CHAS. D. REECE, M.D.,
Austin, Texas

Pellagra is a disease due to a deficiency in the diet and characterized clinically by the digestive symptoms, the dermatitis and the mental and nervous symptoms. Sometimes the disease is mentioned as the five D's (i. e., a deficiency disease with diarrhea, dermatitis, dementia and even death).

The cause of pellagra has long been a bone of contention, and even today there is a conflict of views with ardent believers of various theories. In glancing through the literature over thirty theories have been expounded by medical men. Today, two theories are outstanding, namely, the infection theory and the vitamin deficiency of the P. P. factor (vitamin B_2 and G). The vitamin deficiency theory seems to have been proven both by animal and human experimentation as well as by the results obtained in controlling the disease by correction of diets and yeast.

But it is not the purpose of this paper to prove or disprove any theory or to even outline a plan of treatment. Any recent textbook of medicine should give such information on etiology, history and treatment. I do not believe that the last chapter on pellagra has been written. I am interested, however, in again calling attention to the medical profession of the South to the prevalence of pellagra and the problem in regard to its prevention and control. I might add that the pellagra problem of the South is the pellagra problem of the United States. Pellagra is a disease limited practically to the rural sections of the Southern states and for the most part it is limited to those farming sections where there is only one main money crop, such as cotton or tobacco. In most cases, it is limited to those people whose economic condition is such that they are unable to secure an adequate diet throughout the year. In the old days, a negro slave was valuable, and he was fed. Today, farm conditions have changed. The land owner hires his laborers through the cotton-chopping and cotton-picking season or through the working season and when winter comes the poor white family or the negro family must exist on the food that the landlord allows them through a commissary or rural grocery store where the available foods are non-perishable. The farm laborer or small tenant farmer has to manage as best he can or do without food through these non-working days, and in many instances his diet is limited to bread and molasses. Similar economic conditions exist in the cotton mill districts, the sawmill districts, tobacco factories, and camps where laborers are unable to work through certain months of the year for various reasons. Cornmeal, molasses, salt pork. dried beans and syrup are the cheapest foods that these people can buy and are about the only foods available through the rural store or commissary. If you can picture a small tenant farmer whose landlord will not allow him ground to raise a garden or permit him to have a cow, hogs and chickens and whose economic condition depends on a good crop year, you can readily see another fertile focus for pellagra.

In the South, where there is a large rural population of the poor laboring class, both black and white, and some Mexicans, as in Texas, pellagra can and should be expected unless economic conditions and dietary practices are changed. In Mexico, where the economic and social conditions of the rural people are similar to our potential pellagra population, there is comparatively little pellagra. Although their diet is inadequate and faulty, it must contain those essential food factors from goat meat, goat

*Read in Section on Public Health, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

milk and beans. The pellagra death rate in Mexico is less than 1.0 per cent except for the states of Yucatan and Campeche, where the death rates are 153.8 and 63.6 per cent, respectively. These two states are inhabited by the Mayan race, whose dietary habits are entirely different from the Mexicans, and where large plantation owners control the laborers as in some of our Southern states. In Texas the Mexican death rate for 1930 was 12.2 per cent, while the white death rate was 13.9 per cent and the negro death rate 51.8 per cent.

Pellagra does not respect age, sex or race. It occurs most frequently in adults, more commonly in females, and apparently is about twice as prevalent among the colored race. The following statistics comparing the negro death rate with the white death rate are quite interesting:

STATES	Per Cent of Population Negroes, 1930	Negro Death Rate, 1930	White Death Rate, 1930
South Carolina	45	69.5	24.8
Arkansas	25	60.8	15.3
North Carolina	26	55.8	23.5
Oklahoma	7	54.0	9.8
Texas	13	51.8	13.9
Mississippi	50	47.2	9.6
Georgia	35	45.5	14.1
Alabama	32	39.5	15.5
Florida	29	36.0	8.3
Louisiana	37	30.0	3.9
Tennessee	17	19.9	14.8
Virginia	23	17.3	6.1
Kentucky	9	4.7	5.1
Maryland	16	2.2	.5

A marked feature of this disease is the seasonal prevalence in the spring time following the restricted or inadequate diet through the winter months. The greatest number of deaths in Texas occur during the months of May, June and July (*Chart 1*).

The incidence of pellagra in the South can best be determined by death records, for there is only one state, from the records available, where the reported cases seem to be of any significance. Mississippi's report is as follows:

Year	Cases	Deaths
1924	5,896	412
1925	8,464	561
1926	7,893	564
1927	11,847	689
1928	13,874	747
1929	13,928	727
1930	10,173	573
1931	11,227	541
1932	5,741	308
1933	5,857	267

From the cases reported in Mississippi, there are about fifteen to twenty cases reported for every death. I believe we are conservative in estimating our cases by multiplying the deaths reported by twenty. If we do this, then Texas has about 12,000 cases, giving a total of over 70,000 cases in all Southern states, as shown by the following figures:

DEATHS FROM PELLAGRA, 1933		ESTIMATED CASES, 1933
Texas	615	12,300
Georgia	421	8,420
North Carolina	392	7,840
Alabama	365	7,300
South Carolina	353	7,060
Mississippi	267	5,340
Tennessee	231	4,620
Arkansas	229	4,580
Louisiana	194	3,880
Florida	193	3,860
Kentucky	129	2,580
Virginia	122	2,440
Oklahoma	109	2,180
Maryland	11	220
District of Columbia	7	140
Total	3,638	72,760

As to the average number of deaths over a ten-year period (1924-1933), Texas stands first with 755 deaths as shown in *Chart 2*, but according to death rates as of 1930, Texas ranks seventh with a pellagra death rate of 19.0 per cent.

In comparison of death rates for 1930, South Carolina has the highest pellagra death rate with 35.2 per cent per 100,000 population, and North Carolina is a close second with 31.5 per cent, and Mississippi is third with a death rate of 28.5 per cent (see *Chart 3*). Strange as it may seem, West Virginia, with a population of nearly two million people, has not had any deaths from pellagra reported.

The effects of the Mississippi flood of 1927 on the economic conditions of Arkansas, Tennessee, Mississippi and Louisiana are shown by the increase in the deaths from pellagra for 1927 and 1928 in these states, as shown in *Table A*. For comparison, the statistics on New York, California, Illinois, Arizona and New Mexico are shown in the table.

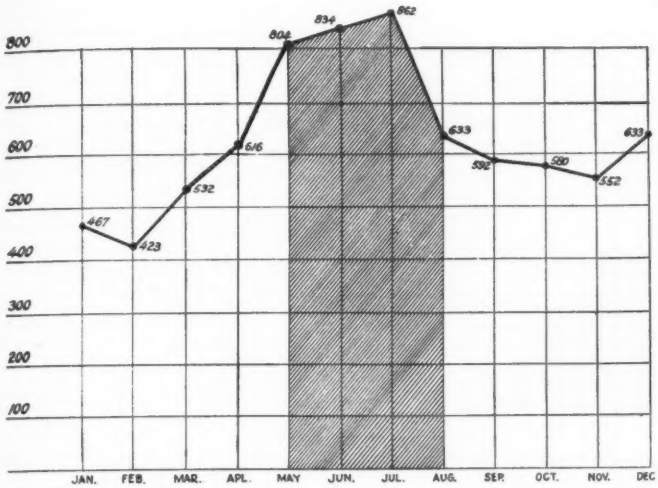
According to this table, pellagra showed a marked increase from 1924 to 1927 in Arkansas and Tennessee and then has gradually decreased to about the same place in 1933 as it held in 1924. In Alabama, Kentucky, Mississippi and South Carolina there was a steady increase in pellagra with their peak year in 1928, and since that time a gradual decline has occurred,

Nineteen hundred and twenty-nine was the peak year of the ten-year period for Florida,

Louisiana, Georgia and Virginia, and since that time these four states have shown a marked decline.

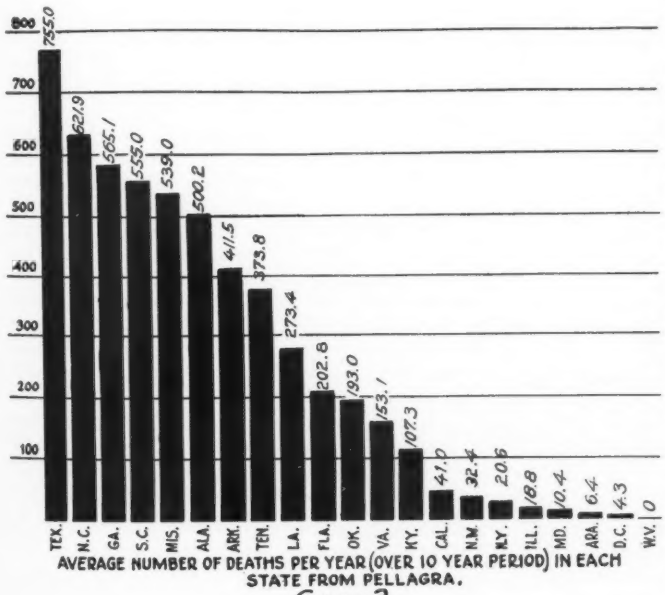
Texas, Oklahoma and North Carolina had their greatest number of deaths in 1930, and since 1930 there has been a steady decline. As shown by *Chart 4*, pellagra in the South was most prevalent from the years 1927 to 1930, and as soon as an organized effort was made to combat the disease, there has been a steady decline despite the depression.

Thus, if we could go into all of these unfavorable economic situations such as the Mississippi flood of 1927, droughts of 1928, 1929 and 1930 and the general depression of 1930, we could explain the increase of pellagra in 1927 to 1930 or 1931. On the other hand, if we could survey all of the efforts made by the various agencies, including the American Red Cross, the state health departments, the agricultural agencies and the relief agencies in correcting dietary conditions, we could readily understand why pellagra has begun to decrease.



GRAPH SHOWS TOTAL PELLAGRA DEATHS BY MONTHS FOR TEN YEAR PERIOD 1924-1933 IN TEXAS.

CHART 1



AVERAGE NUMBER OF DEATHS PER YEAR (OVER 10 YEAR PERIOD) IN EACH STATE FROM PELLAGRA.

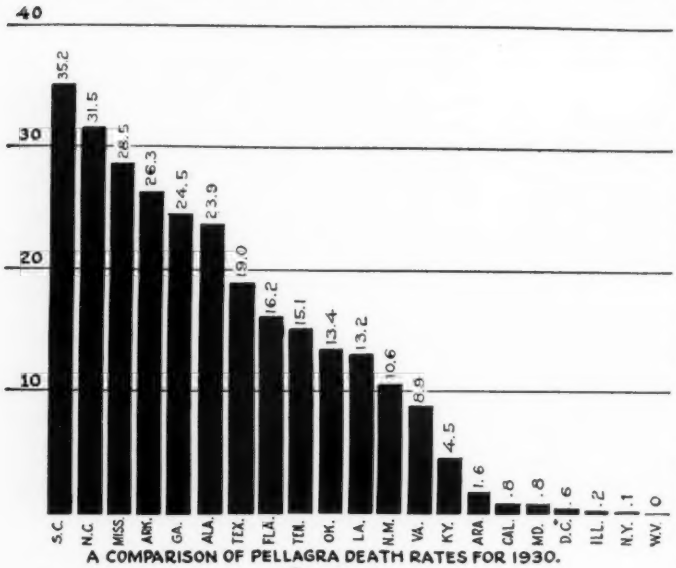
CHART 2

Following the Mississippi flood, the state departments of health and the American Red Cross got busy and distributed large quantities of yeast in the flood states. South Carolina started distributing yeast in 1928, and since that time has been distributing thirty tons annually. Much educational work has been carried on since 1927 in all of these states, and yeast has been distributed through some agency in practically every state.

In Texas, the Extension Bureau of the A. & M. College is cooperating with the State Health Department and their county home demonstration agents and county farm agents are "preaching" pellagra prevention through home garden clubs, canning clubs, 4-H clubs and by urging the rural people to have a cow, chickens and a garden. During the Drought Relief Program of 1931-1932, the American Red Cross was active in

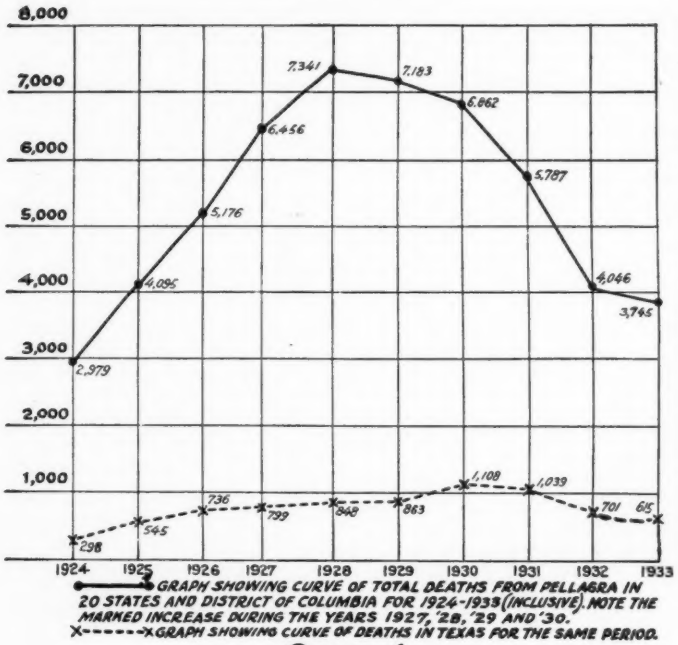
certain pellagra areas of the State and arranged for the free distribution of yeast.

The Texas Relief Commission has played no small part in the pellagra problem in Texas. At present, there are nearly 2,000 cases of pellagra on the relief rolls who are being given an anti-pellagra diet supplemented by yeast. Seeds for home gardens have been furnished and the importance of having a garden and cow has been pointed out. Much educational work has been done by the Relief Commission in cooperation with the State Health Department in combating pellagra. Emphasis is placed on a balanced diet for relief subjects and every county relief administrator has been ordered to carry out this matter in regard to all persons on relief.



A COMPARISON OF PELLAGRA DEATH RATES FOR 1930.

CHART 3



GRAPH SHOWING CURVE OF TOTAL DEATHS FROM PELLAGRA IN 20 STATES AND DISTRICT OF COLUMBIA FOR 1924-1933 (INCLUSIVE). NOTE THE MARKED INCREASE DURING THE YEARS 1927, '28, '29 AND '30.

X------X GRAPH SHOWING CURVE OF DEATHS IN TEXAS FOR THE SAME PERIOD.

CHART 4

The State Health Department has tried to carry on an active educational program during the past two years through the doctors, nurses, the schools, the newspapers, exhibits and through the cooperation of the agricultural agencies and the Relief Commission of Texas. Pellagra has been called to the attention of the public, but a change in the economic conditions and the practices of the agricultural interests must be affected before pellagra can successfully be controlled. The landlord and the large farm operator must be reached, and the importance of a balanced and adequate diet for his tenants and laborers must be stressed. Some plan should be devised where every rural family could have a garden, a cow and some chickens. A program for the distribution of yeast or salmon should be carried out until some economic adjustment can be made and the poor families encouraged to have a garden and a cow.

SUMMARY OF STUDY

(1) Reporting of pellagra cases in the past has been

DEATHS FROM PELLAGRA
IN SOUTHERN STATES

State	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	Total	Average
Alabama	364	418	502	552	698	670	635	448	350	365	5002	500.2
Arizona	*	*	*	7	12	8	7	4	2	5	45	6.4
Arkansas	161	313	491	657	619	503	488	432	222	229	4115	411.5
California	28	47	36	40	54	47	55	43	26	37	410	41.0
Dist. of Columbia	1	2	8	5	2	2	3	7	6	7	43	4.3
Florida	100	125	130	220	290	313	238	220	199	193	2028	202.8
Georgia	337	366	425	671	846	871	713	563	492	421	5651	565.1
Illinois	7	10	15	31	40	15	16	19	14	21	188	18.8
Kentucky	53	42	135	149	165	127	119	84	70	129	1073	107.3
Louisiana	183	343	267	333	333	386	278	240	177	194	2734	273.4
Maryland	3	7	5	18	8	10	14	17	11	11	104	10.4
Mississippi	413	561	564	689	747	727	573	541	308	267	5390	539.0
New Mexico	*	*	*	*	*	31	46	43	18	24	162	32.4
New York	17	13	28	18	9	24	19	33	25	20	206	20.6
North Carolina	273	398	459	712	860	953	1002	696	474	392	6219	621.9
Oklahoma	67	125	201	179	240	288	321	239	161	109	1930	193.0
South Carolina	336	408	529	687	863	711	613	637	413	353	5550	555.0
Tennessee	266	275	530	587	514	406	397	282	250	231	3738	373.8
Texas	296	545	736	799	848	863	1108	1039	701	615	7550	755.0
Virginia	75	97	116	156	193	228	217	200	127	122	1531	153.1
TOTALS	2978	4095	5176	6456	7341	7183	6862	5787	4046	3745	53869	

*Statistics not available

TABLE A.

very poor in all the states except Mississippi.

(2) It is estimated that in 1933 there were over 70,000 pellagra cases in the South with approximately 12,000 cases in Texas.

(3) There has been a marked increase in pellagra in the South following the Mississippi flood of 1927, the droughts of 1928, 1929, 1930 and other economic changes affecting the rural population of the South.

(4) There has been a fairly steady decline in pellagra deaths since active steps have been taken by the state health departments, the American Red Cross, the state and Federal agricultural departments, the Governmental relief agencies and other public health agencies in preventing and controlling pellagra.

(5) Pellagra is a major public health problem in the South and an active program should be carried out in preventing this disease.

(6) There must be a cooperative program between the health agencies, relief agencies, the agricultural agencies and the agricultural interests if pellagra is to be controlled.

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DISCUSSION (*Abstract*)

Dr. M. D. Levy, Houston, Tex.—Education has solved or is solving many of the public health problems of the South. Malaria, yellow fever, typhoid, smallpox and diphtheria are some of the outstanding diseases which are being rapidly reduced to an insignificant status by the education of the masses based on previous carefully controlled and completed experimental work.

Goldberger and his coworkers have demonstrated by rather convincing experiments the cause, prevention and to some extent also the method of cure of pellagra, but after hearing this paper by Dr. Reece, it would appear that this information has fallen on barren ground.

In the United States in 1924, the death rate from pella-

gra was 2.5 per 100,000. This figure steadily increased so that in 1928 the death rate per 100,000 was 6.4. Since then it has been slowly decreasing. In comparison, in Italy, under the imperialistic fascist rule of Mussolini, we find that in 1928 the death rate from pellagra had declined to 0.2 per 100,000 from a previous high in 1900 of 10.7.

It is indeed interesting to learn that in Mexico pellagra is very rare except in those states where tenant farmers and laborers are handled much as they are in our own so-called enlightened country.

While the essayist stated that no attempt was made to discuss treatment, of a necessity in handling his subject frequent mention was made of the use of Brewer's yeast for pellagra. Of passing interest may be one of the recent papers by Tom D. Spies, of Cleveland, on the treatment of pellagra. In this most recent work he has shown that the oral lesions of pellagra yield rapidly to large doses of desiccated hog stomach and to the parenteral administration of massive doses of liver extract. He suggests the use of large doses of liver extract either intravenously or intramuscularly (80 c. c. were administered intravenously in four doses during 20 hours) whenever a severe pellagrin has difficulty in ingesting or assimilating sufficient quantities of a highly nutritious diet.

The laboratory and experimental workers have conclusively demonstrated the means and marterial for combating pellagra and the proposition is now squarely up to the public health agencies to disseminate and inculcate this information as thoroughly as they have done recently with diphtheria.

The reports presented here by Dr. Reece are encouraging and with a continuation of the procedures he has outlined, backed by the energetic perseverance that he and other public health officials have demonstrated, we can confidently look forward to the time in the near future when we shall classify pellagra as one of the rare diseases in the South.

HOSPITAL TEACHING*

By R. Q. Goodwin, B.S., M.D.,
Oklahoma City, Oklahoma

Hospital teaching is a rather general subject for a short discussion. Most of the writing and thinking touching this phase of medical education have been on such subjects as "Bedside Teaching," "Teaching Surgery to Undergradutes," "Teaching Orthopedics," and various other specialties in medical schools. It is easily seen that it is a specialist teaching his subject to undergraduates, and this is the situation obtaining in many schools today. It is not my purpose to deal with any special branch of medical or surgical teaching, but to discuss briefly and in a rather general way some fundamental principles which appear sound and which are proving to be very practical. For the most part it is the work being done at the University of Oklahoma School of Medicine.

The past decade has seen changes in the medical school curriculum which two or three decades ago would have been tolerated only by men of Osler's type, men ahead of their time. The trend has been toward bringing more clinical teaching into the earlier years of medical training. I prefer not to use the term preclinical to designate the first two years in medicine. It is true that in the past the first two years have been widely separated from the clinical or hospital teaching years. Then they were truly preclinical, but with the increasing practice of bringing the first and second-year students into the hospital, giving them increasing amounts of clinical work, we really have no preclinical years, but preclinical subjects given in the first two years.

The schools of the Middle West and West, and to a greater extent than previously the Eastern schools, are preparing men to practice medicine in rural communities where scientific medicine has suffered most. To face the issue squarely, we are training men to replace the old-time country doctor—and I would not in the least discredit the work of this truly great man. His was a great work for and service to humanity. He gave the best there was, and that is why we are called upon to offer vastly more, for there is vastly more to offer. Hence, we are trying to send men into the practice of medicine who have had adequate training in the basic sciences and as much clinical guidance as possible, and I want to emphasize this: as much clinical guidance as possible; men who have been trained to acquire and apply scientific medical knowledge; men who have developed the art of correlating scientific facts with the clinical picture at the bedside. Until this goal is reached, empirical medicine will still be practiced and the public, as well as the profession, will suffer the consequences.

In order to give the medical student as much clinical experience and guidance as possible it is necessary to begin this early in his school career. In order to have the student apply his basic training to the clinical phase he must be shown early how essential this is to the scientific practice of medicine. This work of clinical guidance or supervision, and correlation of subject matter, is now being done very effectively in many schools. First-year students are being shown

*Read in Section on Medical Education, Southern Medical Association, Twenty-Eighth Annual Meeting, San Antonio, Texas, November 13-16, 1934.

*From the Oklahoma University School of Medicine.

hospital cases. This can be made of inestimable value if carried out properly. There are, however, three requisites, the lack of either of which may make this procedure a failure; all of which are necessary for best results. The first requisite is that the cases shown must be selected to exemplify the principles which are being taught at the time in the basic courses. Kolmer, of Temple University School of Medicine, has shown very conclusively how effective this procedure can be made. For example a bacteriology class may be shown a case of typhoid fever with a demonstration of the methods of securing the organism from the blood stream or stool, along with the agglutination test; or a case of streptococcus infection, such as puerperal sepsis, cellulitis, erysipelas, or tonsillitis. There are few medical schools whose hospital facilities are not adequate to furnish an unlimited supply of cases of such practicality. The second requisite is that there must be perfect cooperation and understanding between the teacher of the basic subject and the clinician. The first requisite precludes any other situation. This requires their time for conferences and for working out a program to suit the convenience of each. This program, incidentally, can be of distinct value to both the basic instructor and the clinician. The third requisite, and probably the one most responsible for the success of the undertaking, is a good clinician. Be he a young man who has had ample teaching training, clinical experience, and is capable, or a senior man who has attained seniority gracefully and optimistically, he must be capable of inspiring, as well as imparting knowledge in an interesting manner. To quote Reginald Fitz:

"Any system of bedside teaching in medicine is good if it is conducted by alert instructors who enjoy teaching and clinical medicine, who can teach people as well as disease, who know how to deal with the foibles of humanity as capably as with illness, and, most important, who are so gifted that they can make memorable and worth while to students anything they may say."

He must be a man who can talk the basic language and introduce clinical terminology in the elementary form. It is here that the ideals of medicine are most firmly grounded in the minds of students.

If the above requirements are met the results will be that; the first-year student will recognize the relation of the basic subject matter to clinical medicine, a very necessary recognition; he will feel that he is really studying medicine; and he will get an inspiration from the clinician which will early place his profession on a plane higher than which there is no other.

The second-year student is introduced into the hospital more extensively. His foundation is such that he is capable of seeing a greater variety of cases, hospital specimens, and hospital equipment. For example, at the University of Oklahoma School of Medicine, through the cooperative work of Dr. Shoemaker, head of the Department of Pharmacology, the university hospitals have a room in which the crude products of the common drugs used in the hospitals are displayed. Alongside this crude product the various preparations derived from these are shown. The dosage of these preparations and their actions are briefed here. In this room, when fully equipped, will be a U. S. Pharmacopeia, pharmacology texts, and toxicology and therapeutic references. This room, operated in connection with the hospital drug room and with the full cooperation of the therapy staff, offers a continuous study from the second through the third, fourth, and intern years of hospital work. Other basic departments are doing comparable services in connection with the hospital and clinical staff. This is as should be and is approaching a more nearly ideal educational program.

In addition to the application of the basic work in the second year, purely clinical instruction is introduced. Early in the year case records which are complete in every detail are presented in order to give a correct idea regarding the record content, arrangement, and value. These are given in connection with the hospital cases. Later, patients are shown in whom pathological physical findings are demonstrated. All of this is under clinicians capable of presenting information in the proper way.

Thus far, to the end of the second year, it is seen that the primary work is that of the basic sciences, with their importance pointing toward their hospital usefulness, and from the clinical aspect their demonstrated relation to clinical medicine.

The third year in medicine is the most critical one in hospital teaching. Here the habits of case study and management are formed and become so fixed that they are permanent. Consequently it is necessary to have proper supervision and direction in their formation.

At the University of Oklahoma School of Medicine the junior student has a half year of intensive hospital work in his clerkship course. From one and one-half to three hours daily each clerk spends in the hospital. He receives thorough in-

struction on history taking, physical examination, laboratory work, bedside conduct and study, and differential diagnosis, before he is taken to the wards. When this is done he is assigned a case for a complete workup.

The bedside study of the patient is made by the clerk, with no particular time limit on his part, so long as he is making progress with the study. With all the data recorded and the diagnosis made, his findings and conclusions are checked by his supervisor. If his conclusions are logical and justified the clerk begins both an intensive and extensive study of the condition which his patient exemplifies, keeping close continued observation of his patient so long as he resides in the hospital.

It is here that the clerk reviews his basic work and applies it at the bedside. For example, to use the Pharmacology Department again, since it was explained above, the clerk in studying the drugs used on his patient may go back to the Pharmacology Department for advice. He goes to the crude product room, and to the hospital drug room, and may even fill prescriptions and examine them. He studies not only the primary action for which the drug was given, but the other actions which the preparation may have and which at times contraindicate its usage. It is here that the clerk masters the drugs used and in so doing establishes a habit of knowing what he is giving, why he is giving it, and what he may expect of it. This illustrates the type of review he makes in only one department. His reviews in anatomy, physiology, pathology, and so on are just as extensive.

In addition to this review and application, the clerk is introduced to a reading program in connection with his case. He is taught how, if need be, and required routinely to read the current literature on the condition he has diagnosed. These readings are very extensive at times, but are productive of most excellent results in that the clerk gets the correct viewpoint of case study, he broadens his clinical knowledge immeasurably, and he acquaints himself with the authorities on whatever condition he may be studying. The value of this program can be appreciated only by those in constant contact with the clerk in the hospital.

This work is all supervised closely. Initiative is encouraged and developed, but adequate supervision or guidance is of paramount importance. A few years ago, while checking the physical findings of a colored man in whom the clerk had made a tentative diagnosis of carcinoma of the liver I remarked to the clerk that I should like to see a puncture biopsy of the liver. With that I passed on, thinking no more of the suggestion. Four days later this clerk stopped me in the hall and gave me a report of his proceedings, the biopsy findings, and his proven diagnosis.

Many of our clerks have plenty of initiative, while others have to be pushed into their endeavors. It is here that the individual guidance or supervision which makes hospital teaching of greatest value is supplied.

When the clerk has his case worked up and feels well enough informed to come to conclusions, he is allowed to give his entire report to the others of his group, usually eight or ten, and to the supervisor, who may quiz him and discuss the case report thoroughly. This, in brief, is the type of hospital teaching done in the junior year.

In the senior year the clerk has a rotating service in the hospital directly under the intern, but is responsible to his supervisor for the work he does. Intensive case study, case summary, and clinical presentation are stressed. The senior clerk's work becomes permanent hospital record. The same review system and reading program that is required in the third year is stressed in the fourth year and is obtained without difficulty. In fact, it is rather a matter-of-fact proposition and followed accordingly. With it all, supervision and guidance at times becomes largely individual. This, above all else, is of most importance.

These principles are carried to the fifth, sixth, and seventh years of hospital work with gratifying results. There are few interns who do not need and may not profit by proper supervision and guidance.

I would emphasize, then, the introduction of clinical teaching in the first years of the medical curriculum; the correlation of basic with clinical data; the organized cooperative efforts of the basic and clinical teachers, and, above all else, constant capable supervision and guidance by clinicians who can inspire, as well as impart knowledge.

This general program of hospital teaching, given in and with the full cooperation of the various well-organized departments, is increasingly showing its merit in the production of effi-

cient, conservative, progressive young men and women in the medical profession.

DISCUSSION (*Abstract*)

Dr. Harry C. Schmeisser, Memphis, Tenn.—We have just held at the University of Tennessce for the first time a comprehensive examination of medical students after their completion of the preclinical courses to determine preparedness for entrance into the clinical courses and we have found that students who, at the end of a course were well trained, had forgotten a great deal more than one would expect. It has been decided to introduce a vacation quarter to be followed by the comprehensive examination at the end of the sixth quarter before they enter upon the clinical courses, this quarter to be used for rest and review. The examination is conducted by the clinical faculty, with the preclinical faculty in attendance. This gives an opportunity to the clinical faculty to find out for themselves if the students are prepared to take up the clinical courses. The preclinical faculty learns what it has over- or under-emphasized in giving the course.

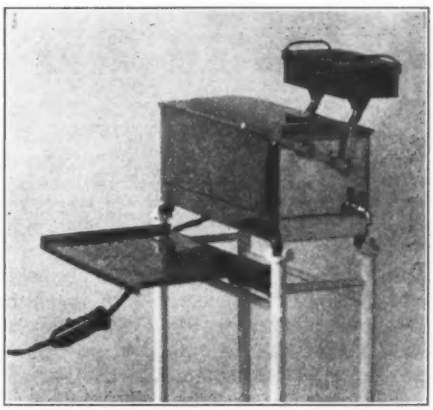
AUXILIARY STERILIZER

By A. L. Atwood, M.D.,
Birmingham, Alabama

The accompanying illustration shows a small auxiliary steam sterilizer for syringes and other glassware, which has now been used by me for six months. Prior to that time I employed one boiler for heavy metal instruments and another smaller one for the glassware; and even then the latter would collect a gummy sediment from the water; and of course, there was the usual breakage of glassware.

Since this upper, or auxiliary, chamber is supplied only with steam from the lower boiler, there is no additional expense of operation and there is no water except from condensation. Hence, there is no gummy sediment. Since it does not come in contact with any of the metal instruments of the lower chamber, the breakage of glassware has been reduced to practically nothing. During the six months of its use I have broken but one syringe.

The device, which consists of a smaller metal sterilizer suspended by offset, curved pipes back of, and above, the main metal boiler, can be attached by any tinsmith. I have used two three-fourths-inch pipes of copper for the connection and both sterilizers are of that material; but other metals could be employed. The advantage of the two three-quarter-inch pipes is that they are large enough to conduct an ample amount of steam from the lower boiler where it is generated, and at the same time are substantial enough to support the upper compartment. Needless to say, they should come off of the main boiler at a high enough level



to carry off the steam. Any steam that may condense into water in the auxiliary chamber above runs back by gravity into the lower boiler.

The low cost of installing such a device will soon be paid for by the saving in syringes and other glassware, not to mention the satisfaction of having syringes free from "goo, gunk and gurry."

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
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DIABETES AND ARTERIOSCLEROSIS

The results of insulin treatment of diabetes have been the most spectacular in the history of modern medicine. As time passes, however, its deficiencies are becoming more manifest. While it has prolonged life and made it more enjoyable for the diabetic, insulin has not greatly reduced diabetic mortality. It has served rather to change the immediate cause of death.

Diabetic deaths in the decade before insulin, that is, from 1913 to 1923, in the Peter Bent Brigham Hospital in Boston were analyzed. The most frequent cause was coma, with or without a terminal infection. The second commonest cause of death was sepsis; the third, cardiovascular-renal disease, including gangrene, and the fourth was pulmonary tuberculosis.[1]

It is of interest to note the changes which insulin has made in this list.

Arteriosclerosis was common in the pre-insulin era. Its premature development was reported by Joslin.[2] It was hoped that insulin would prevent it. In 1930 Shields Warren,[2] of Boston, after an extensive analysis of diabetic postmortem material, commented upon the increased prevalence of arteriosclerosis. He said: "I have yet to see at autopsy a diabetic or to read the autopsy protocol of a diabetic whose disease has lasted five years or more, free from arteriosclerosis, regardless of age. However, I hasten to add with real pleasure that I have never performed a postmortem examination on a young person who has had diabetes five years or more with insulin treatment throughout the course of the disease."

Flynn,[1] writing in 1935 on the deaths of diabetics in the Peter Bent Brigham Hospital, still observes that insulin treatment has not prevented the development of precocious cardiovascular disease in juvenile diabetics. The marked increase in the mortality from cardiovascular complications, says this author, is the outstanding defect of modern treatment. The good results of the insulin era are tabulated as follows: the average duration of life following the onset of diabetes has been prolonged. The mortality rate of new cases in the hospital has been reduced from 9 to 7 per cent. The nutritional level has been raised. Coma is infrequent and sepsis less common. Cardiovascular disease has, however, increased in frequency and the present mode of treatment appears to have no beneficial influence upon it.

1. Flynn, John M.: Changing Cause of Death in Diabetes Mellitus. Amer. Jour. Med. Sci., **189**:157, Feb., 1935.

2. Warren, Shields: Pathology of Diabetes Mellitus. Philadelphia: Lea & Febiger, 1930.

EXPERIMENTAL LEUKEMIA AND MALIGNANT MYELOMA

Experimental tumor production has confused the subject of the cause of cancer as much as it has clarified it, since many contradictory facts are brought to light. Irritation cancers are produced by repeated painting of an animal's skin with certain tars; presumably similar irritation growths are induced in human beings who work with particular coal tar dyes. The late developing bone sarcomas of the watch dial painters, who pointed a radioactive brush with their lips, may be taken as irritation malignancies. Various products called carcinogenic have formulas which resemble the hormones, which suggests a possible internal origin of cancer. In contrast, there are the transmissible tumors of rats, mice and fowls, which lend some sort of nourishment to the theory of bacterial origin.

Leukemia of human beings is considered in some quarters as a malignant growth of the blood cell producing tissue. It has been shown that lymphatic leukemia of mice and guinea pigs

is transmissible from animal to animal.[1] The studies of Jacob Furth[1] upon another type of mouse leukemia, myelocytic leukemia, and its relation to malignant myeloma, are of significance. A case of spontaneous myeloid leukemia in a mouse was discovered on routine examination and the condition was successfully transmitted to other mice in the colony. There was considerable variation in the susceptibility of the individuals and of families, but practically all mice could be infected if they were radiated before inoculation. Cell-free filtrates did not carry the disease. The characteristic cell transmitting leukemia was identified as a myelocyte with basophilic granules. The course of the disease depended upon the presence of this viable cell, which apparently reproduced itself, the choice of animal, and the route of inoculation.

If the characteristic cell was introduced into the subcutaneous tissues, a tumor appeared after lapse of a considerable period, two to three months. If a large dose of the malignant cells was given, there was diffuse myelosis with tumor formation. On intravenous injection, the same cell produced fatal myeloid leukemia in two to three weeks. The blood smears of mice which were intravenously inoculated showed numerous basophilic myelocytes with almost no other cells. In mice inoculated subcutaneously or intraperitoneally, the blood appeared normal for several months, though there was often a terminal leukemia. The blood smears of mice with multiple myelomas were usually free from the basophilic myelocytes.

Myeloid cells in the new host, according to Furth, originate from those that are introduced. They are not derived from the inoculated animal. In this they resemble a bacterium, which on inoculation into favorable media multiplies. In all instances in which subcutaneous inoculation was successful, a tumor was formed at the site of injection, composed of cells indistinguishable from those injected. The tumor was just palpable six to twelve weeks after inoculation, grew slowly to 3 to 5 cm. diameter, and the mouse died in three to five months. Large tumors at times ulcerated and a few regressed. Two factors were significant in determining whether leukemia or myeloma was produced: the route of entry and the resistance of the host.

The soil favorable to growth, according to Furth, may differ with each malignant cell. The malignant myelocyte of one strain grows well in areolar and muscle tissue; another favors the ovaries. Irradiation of the entire bodies of leukemic mice prolonged their lives; it is suggested through destruction of many of the malignant cells.

Transmissible myeloid leukemia of mice, then, appeared to be a neoplasm. Multiple tumors could be produced by inoculation with the same cell.

1. Furth, Jacob: Transmission of Myeloid Leukemia of Mice. Its Relation to Myeloma. Jour. Exper. Med., **61**:423, March, 1935.

GLEANINGS FROM RECENT JOURNALS

Late Complications of Irradiation of Carcinoma of the Cervix.[1]—For the complete eradication of malignant growths, considerable destruction of normal tissue either by surgery or irradiation is usually considered not too high a price to pay. Treatment of cancer of the cervix has for some years been rather standardized and effective. Various injuries resultant from the treatment have been reported, many of which of course do not show for a number of years.

The late results of irradiation in a series of 371 cases treated with radium, x-ray and surgery between 1921 and 1933 have been reviewed by Newell and Crossen, of St. Louis. The complications were less severe than those which formerly were noted following treatment of this condition. There were five cases of rectal stricture, mostly mild and yielding to dilatation. Four cases of bladder ulceration developed from 2½ to 6 years after irradiation. One case is reported of severe subcutaneous infiltration, which caused thickening and irregularity of the skin of the abdomen, and later severe sloughing, which kept the patient in bed for eighteen months. Two other mild grades of the same process were seen.

Such serious lesions as rectovaginal and vesicovaginal fistulas in the early days of irradiation were not infrequent. Fortunately proper screening and adjustment of dosage prevented these injuries in Newell and Crossen's cases, and the number of complications was very few for the large series reported. The importance is emphasized of careful attention to technic in the use of irradiation and the greatest possible protection of adjacent structures.

Inheritance of Enuresis.—In the case of the fruit fly, the sweet pea, the guinea pig, it is easy to understand the operation of the Mendelian principle of heredity and the transmission of pink eyes, white, red or blue petals, black

1. Newell, Quitman U.; and Crossen, Harry S.: Late Complications in Irradiation Treatment of Cancer of Cervix. Surg., Gyn. & Obst., **60**:763, April, 1935.

hair or albinism, as recessive or dominant characteristics of the offspring. Maud Slye, in her studies on mice, has described susceptibility to such diseases as cancer or tuberculosis as inherited according to the Mendelian law, and has bred colonies of mice in which a particular type of malignant growth may be predicted at a definite age.

Application of Mendelian principles to human characteristics other than the objective traits of color or size is usually complex. Such a habit as enuresis, or bedwetting after the age of three, would appear to depend upon many environmental factors. On first thought, enuresis resembles such a defect as thumb sucking, intemperance, kleptomania, chorea, temper tantrums. It would seem to be a behavior trait, as differentiated from such inherited characteristics as pigmentation, or bone or tooth size.

Frary,[1] of the University of Minnesota, has made a detailed statistical study of 59 families in which there occurred one or more enuretic children. Despite the many factors involved in the development of this habit, she reports that enuresis occurred in a large group of individuals very exactly according to Mendelian predictions. The defect she believes to be a hereditary trait determined by a single recessive gene. It may be bred in or out of a family tree.

Effects of Violent Exercise.—Athletics in some quarters is perhaps encouraged beyond the point of tolerance. Japanese investigators[2] have attempted to secure objective criteria of the results of moderate and violent exercise. They have estimated several urinary constituents in a group of boys and men, after short and long distance racing.

After long distance racing, albuminuria was observed in nearly all the subjects. There was no glycosuria. The ratio of creatinine (index of tissue metabolism of protein) to total nitrogen excretion increased shortly after exercise, then gradually decreased till the original value was reached. The greater the fatigue, the higher the increase and the longer the time required for the restoration of the original value. Excretion of phosphoric acid increased. Boys became less fatigued during a long race than did men, and the urinary constituents were less changed.

Utilization of carbohydrate is presumably increased in exercise, though no estimation of this effect is offered in the data of the Japanese studies, unless the increased phosphoric excretion be taken as indicator of carbohydrate destruction. Blood chemical analyses, particularly the alkali reserve before and after exercise, might present other indications of degree of fatigue.

1. Frary, L. G.: Enuresis, a Genetic Study. Amer. Jour. Dis. Child., **49**:557. March, 1935.

2. Nakagawa, Itsiro; and Kawamo, Kensei: Metabolism in Children During Muscular Work: Effect of Racing on the Urinary Constituents in Boys. Amer. Jour. Dis. Child., **49**:594, March, 1935.

TWENTY-FIVE YEARS AGO
From Journals of 1910

Controlling the House-Fly.[1]—"We should not assume * * * that the house-fly will entirely disappear in the near future. It is a remarkably persistent form and it is probable that the housekeeper will feel compelled for some years to come to use screens and other devices to prevent this insect gaining free access to the home."

Medicine and Pharmacy.[2]—"The druggist * * * should attend to his own business and to nothing else. By acting physician, he endangers the health of the people, degrades his own professional standing, and loses the confidence and patronage of the physician * * * would not trust a prescribing druggist. For a man who allows himself to practice a profession which he never studied, purely for material gain, is dishonest enough to commit all forms of substitutions and even to replace ingredients should it suit his financial purpose."

Death from Intraspinal Injection of Novocain and Strychnin.[3]—"The patient * * * had a large elephantiasis of the scrotum, weighing 31 pounds. An injection of 3 c. c. of distilled water containing one milligram of strychnin hydrochlorid and one decigram of novocain was given between the eleventh and twelfth dorsal vertebrae. Onset of anesthesia was rapid and in 5 minutes had reached the level of the nipples. * * * The patient stopped breathing * * * it was noticed that the arms were rigid from spasm. * * * death was due to respiratory failure, * * * a result of spasm from the action of strychnine on the medulla."

Prevention of Neurosyphilis.[4]—"* * * The so-called parasyphilitic nervous diseases * * * devel-

1. Felt, E. P.: Methods of Controlling the House-fly and Thus Preventing the Dissemination of Disease. N. Y. Med. Jour., p. 18, April 2, 1910. Abst. J.A.M.A., **54**:1335, 1910.

2. Barbour, M.: The Relation of Medicine to Pharmacy. N. Y. Med. Jour., p. 20, April 2, 1910. Abst. ibid.

3. Gabbett, W.: Death from Intraspinal Injection of Novocain and Strychnine. Ind. Med. Gaz., Feb., 1910. Abst. J.A.M.A., **54**:1341, 1910.

4. Collins, Joseph: Syphilitic Diseases of the Nervous System. J.A.M.A., **54**:1349, April 23, 1910.

oped as soon after infection and as virulently*** in those who had received what is considered to be adequate treatment for syphilis, as they did in those who had received little or no treatment. * * * Nearly all had been given potassium iodid often in large doses in the early stages * * * and in the majority of cases the mercury given was administered in pill form. * * * We shall be able materially to diminish the occurrence of syphilitic nervous diseases by advocating the use of mercury as a specific for syphilis and depreciating the use of iodid of potassium save as an absorbefacient of gummatous tissue."

Book Reviews

The Clinical Aspects of Visceral Neurology with Special Reference to the Surgery of the Sympathetic Nervous System. By W. K. Livingston, M.D., Clinical Associate in Surgery, University of Oregon Medical School. 254 pages, illustrated. Springfield, Illinois: Charles C. Thomas, 1935. Cloth, $5.00.

This monograph on surgery of the sympathetic nervous system, or of the visceral nerves, to use the author's terminology, is indeed timely. Clinically, only those conditions to which surgery has brought therapeutic benefit are discussed. However, preceding the clinical discussion is a very excellent resume of the anatomical and physiological phases of this very interesting subject.

The author's broad clinical experience is reflected in the second part of the book, wherein some of the conditions for which sympathectomy has been done are discussed in detail. Of particular value to those who have more recently interested themselves in neurosurgery are the preoperative methods of observation and study.

Part three is devoted to a practical description of surgical procedures and methods of determining their prognostic value.

The author's directness of approach and the elimination of much extraneous discussion is most pleasing, and the term he has used to include the entire sympathetic system, namely, the visceral nervous system, is acceptable and comprehensive.

Much artistry is exemplified by the publisher.

Clinical Pathology of the Jaws with a Histologic and Roentgen Study of Practical Cases. By Kurt H. Thoma, M.D., Charles A. Brackett Professor of Oral Pathology in Harvard University. 643 pages, illustrated. Springfield, Illinois: Charles C. Thomas, 1934. Cloth, $9.00.

The special field covered by Thoma's book is one in which the experience of the individual physician or surgeon is apt to be limited. It is one also whose problems are to some extent peculiar to itself. Realizing these facts, the author presents a wide survey of the varied types of disease affecting the jaws and related structures and adds to his more didactic exposition a wealth of clinical records. Detailed reports of actually observed cases illustrate and illuminate the rarer as well as the more common lesions discussed. The experiences recounted serve sometimes to point a diagnostic or therapeutic moral as well. The author's wide clinical experience is evident throughout and always there is emphasis upon the relationship of the underlying pathology to the interpretation of subjective and objective signs of disease. The book is not without fault. It offers the minor irritations of the typographical error and the occasional lapse in word usage. Illustrations are strikingly plentiful, but they are not uniformly good. Too often the photomicrographs are inadequate or even indecipherable and the same is true to a lesser degree of the radiographs. Close reading reveals in text and in illustrative cases, even though rarely, a suggestion that judgment has not been sufficiently critical whether as to statement of general theory or as to conclusions in a particular case. As example of the former may be cited the disposition to accept as evidence one quoted author's promise that startling information pointing to the infectious origin of neoplastic disease is about to be announced; while as example of the unsatisfying case report is an instance of tuberculosis of the jaws in which the photomicrograph is not convincing and the patient's subsequent death is ascribed on admittedly insecure grounds to pulmonary tuberculosis. From the standpoint of pure pathology the text is not always adequate and particularly in the tumor sections it is occasionally beclouded through the inclusion of a multiplicity of types whose authenticity might at the least be called into question.

With these things said, the book remains a real contribution in its field. Its earnestness and honesty compel admiration and the criticism brought against it is more than balanced by its general clarity and helpfulness.

Poliomyelitis: A Handbook for Physicians and Medical Students Based on a Study of the 1931 Epidemic in New York City. By John F. Landon, M.D., Attending Physician, Willard Parker Hospital, New York, N. Y.; and Lawrence W. Smith, M.D., Pathologist, Willard Parker Hospital, New York, N. Y. With a section on the orthopedic after-care of the disease by Garry DeN. Hough, Jr., M.D., F.A.C.S., F.A.A.O.S., Attending Orthopedic Surgeon, Shriners' Hospital for Crippled Children, Springfield, Mass. 275 pages, illustrated. New York: The Macmillan Company, 1934. Cloth, $3.00.

The authors illustrate the difficulty of making specific statements about poliomyelitis, because of the complexity of the disease and lack of knowledge of the basic epidemiology. However, a fair and impartial evaluation of various theories as to causation, pathology and ultimate tissue change is given and the text is supported by an extensive bibliography.

The chapter on pathology of poliomyelitis contains valuable data. There is a full discussion of treatment and comparison of methods given. The chapter on orthopedic after-care will appeal to the physiotherapist interested in poliomyelitis. The book is valuable to the practitioner and student.

Elementary Human Anatomy, Based on Laboratory Studies. By Katharine Sibley, Professor of Physical Education, School of Education, Syracuse University, Syracuse, New York. 380 pages, illustrated. New York: A. S. Barnes & Co., Inc., 1935. Cloth, $4.50.

Elementary human anatomy is made readable and interesting in this handbook. The illustrations and comments are to the point. A tedious study is made attractive and an excellent ready reference is presented for the undergraduate student, the mechanotherapist and physiotherapist. Anyone interested in physical education will find in this book much succinct and worth while information. The index is complete and leads one directly to the subject sought. This is a needed departure from voluminous textbooks on human anatomy.

The 1934 Year Book of Urology. Edited by John H. Cunningham, M.D., Associate in Genito-Urinary Surgery, Harvard University Postgraduate School of Medicine. 461 pages, illustrated. Chicago: The Year Book Publishers, Inc., 1934. Cloth, $2.25.

Urologic literature during the past year has maintained its high standards. There are more of the younger men contributing to this volume than usual with an attendant intoduction of new ideas. Prof. G. Marion, of Paris, outlines the fundamental principles of urology. There are a number of articles on the factors influencing renal function. William F. Braasch admonishes the medical profession for a slow response to the use of intravenous urography. Ten pages are devoted to the adrenal glands; interest is manifest not only in tumors, but also the physiology and manifestations of adrenal pathology. G. F. Hock discusses irritable bladder in the female. The transurethral operations are the subject of a number of papers and to them the Editor has added a succinct discussion in which he mentions the increased use of the incontinence clamp.

The 1934 Year Book of the Eye, Ear, Nose and Throat. The Eye: by E. V. L. Brown, M.D., Professor of Ophthalmology, University of Chicago, Attending Ophthalmologist, St. Luke's Hospital, Chicago, and Louis Bothman, M.D., Associate Professor of Ophthalmology, University of Chicago. The Ear, Nose and Throat: by George E. Shambaugh, M.D., Professor of Otology, Rhinology and Laryngology, Rush Medical College of the University of Chicago, Otolaryngologist of the Presbyterian Hospital, and Elmer W. Hagens, M.D., Assistant Clinical Professor of Otolaryngology, Rush Medical College of the University of Chicago, with the collaboration of George E. Shambaugh, Jr., M.D., Clinical Assistant in Otolaryngology, Rush Medical College of the University of Chicago; Resident in Otolaryngology, Presbyterian Hospital. 621 pages, illustrated. Chicago: The Year Book Publishers, Inc., 1935. Cloth, $2.50.

This book follows the practice of previous years, being divided into two sections, the first on the eye and the second on the ear, nose and throat. Of interest to the general practitioner are abstracts on the types of bacteria found in conjunctival infection, the clinical signs of trachoma, burns of the eye, dermatitis from eye lash dye, malingering tests and night blindness. The portion on ear, nose and throat offers more to the physician, as it is in this field that a great deal of his work is found, and the field is well covered by a large number of abstracts. Among the articles abstracted are a treatment for furunculosis of the external auditory meatus, paracentesis in children, x-ray treatment of acute mastoiditis, a rehearsal of the standard hearing function tests, measures that may aid in progressive deafness, hypertonic muscles of the neck causing headache, the treatment of acute coryza by opiates, external ethmoidectomy, conservative treatment of frontal sinusitis and in cases of allergy the editor drops a very *apropos* hint: "It is increasingly important that the physician be endowed with a reasonable degree of sense."

The Autonomic Diseases or the Rheumatic Syndrome. By T. M. Rivers, M.D. 299 pages. Philadelphia: Dorrance & Company, Inc., 1934. Cloth, $3.00.

The author's main thesis is as follows: arthritis is due to the toxins of local infections; these toxins are of amine nature; their action is primarily on the sympathetic nervous system; through the sympathetic nervous system these toxins affect the fibrous and elastic tissues and are thereby responsible for arthritis and other forms of rheumatism. In addition to the disorders of the muscles and joints the author believes that many diseases of the heart, of the blood vessels, respiratory, alimentary and urinary tracts are similarly brought about by the indirect effects of such toxins on smooth muscle. The author has evidently given a great deal of thought to the subject on which he writes, and has read widely. The chief value of his book would seem to reside rather in the careful clinical descriptions than in his theories of etiology, which cannot be regarded as proven.

Report on Seventh International Congress of Military Medicine and Pharmacy and Meetings of the Permanent Committee, Madrid, Spain, May 29-June 3, 1933. By Captain William Seaman Bainbridge, MC-F., USNR Member of the Permanent Committee, Delegate from the United States. 88 pages, illustrated. Wisconsin: George Banta Publishing Company, 1935. Cloth.

These reports represent the interchange of medico-military information between the participating countries as well as being a step toward international good will. These delegates have come together for the common purpose of the relief of pain and suffering. Not only are their findings applicable to war, but they are often of value in peace. Following the delivery of the reports the Congress adopts conclusions which are agreed upon by the members. The topics covered this year were: "General Principles of Medical Service During War Time," "Preventive Vaccination," "Advance Post Treatment," "Preserved Foods," and "Dental Service."

One Hundred and Fifty Years of Publishing, 1785-1935. Philadelphia: Lea & Febiger, 1935. Cloth.

A sketch of the history of Lea & Febiger during the past 150 years. In 1820 the company first began publication of the *Journal of the Medical Sciences,* which they point out is the second oldest medical journal in the English language. Since the publication of Gray's Anatomy in 1859, the house has been specializing in medical literature and its collateral lines.

A Textbook of Nursing Technic. By Marion L. Vannier, R.N., Formerly Superintendent of Nurses, University Hospital, and Director of the School of Nursing, University of Minnesota, and Barbara A. Thompson, R.N., B.S., Director of the Wisconsin Bureau of Nursing Education, Formerly Assistant Superintendent of Nurses, University Hospital, Minneapolis. 265 pages, illustrated. Minneapolis: The University of Minnesota Press, 1935. Cloth, $2.50.

In this revision a few procedures which are thought by the writers to belong more properly in a ward manual have been omitted. The procedures are so clearly outlined that they may be followed with accuracy. An excellent guide covering the field of nursing technic.

Annual Report of the Surgeon-General of the Public Health Service of the United States for the Fiscal Year 1934. By H. Morgenthau, Jr., Secretary, Speaker of the House of Representatives. 143 pages. Washington, D. C.: 1935. Cloth, 75 cents.

In spite of inadequate appropriations and personnel, the Public Health Service has continued its job in a creditable manner. The death rate for the United States is recorded as the lowest it has ever been. There has been no introduction of diseases from abroad. Quite a bit of scientific research has been done, especially concerning the pollution of streams by distillery wastes.

Southern Medical News

ALABAMA

The Medical Association of the State of Alabama held its sixty-eighth annual meeting in Mobile April 16, 17 and 18 with headquarters at the Battle House.

The Alabama Urological Association met in Mobile on April 16 and had as guest speaker Dr. Henry W. E. Walther, of New Orleans.

The following physicians are members of the State Legislature: Dr. W. A. Parrish, Midland City; Dr. L. A. Weaver, Rogersville; Dr. D. T. Street, Alexander City; Dr. W. C. Miles, Oneonta; Dr. W. C. Braswell, Elba; and Dr. R. L. Hill, Winfield.

Deaths

Dr. Thomas Ellis Tucker, Monroeville, aged 43, died December 19.

Dr. Warren Linwood Earnest, Winfield, aged 65, died January 25.

Dr. Marcus Warland Laney, Birmingham, aged 71, died February 5 of cerebral hemorrhage following a fall.

Dr. Mordecai Edward Doughty, Slocomb, aged 59, died February 3 of septicemia.

Dr. Lee Jones, Blount Springs, aged 53, died January 11 of heart disease.

Dr. James Edward Terry, Red Level, aged 59, died February 5 of strangulated umbilical hernia.

Dr. Oscar Suttle Justice, Central, aged 74, died February 10 of cerebral hemorrhage.

Dr. Millard Lafayette Stephens, Haleyville, aged 52, died February 1 of pneumonia.

Dr. William M. Finley, Blountsville, aged 77, died January 24 of chronic myocarditis and hypertrophy of the prostate.

Dr. Thomas P. W. Brooks, Hackleburg, aged 87, died December 15.

Dr. Jesse Gulledge, Tallassee, aged 61, died December 19.

Dr. Charles Webb Sheppard, Honoraville, aged 73, died recently of acute nephritis.

ARKANSAS

The Arkansas Medical Society held their sixtieth annual meeting in Fort Smith April 15, 16, 17 with headquarters at the Goldman Hotel.

The Boone County Medical Society elected the following officers for the coming year: Dr. J. G. Gladden, Western Grove, President; Dr. L. Lloyd Jackson, Harrison, First Vice-President; Dr. G. K. Sims, Harrison, Second Vice-President; Dr. W. H. Poyner, Harrison, Secretary-Treasurer.

The Carroll County Medical Society elected the following officers for the coming year: Dr. J. F. John, Eureka Springs, President; Dr. A. L. Carter, Berryville, Secretary-Treasurer.

Dr. S. J. Wolfermann, Fort Smith, and Dr. B. A. Rhinehart, Little Rock, were guest speakers at the Muskogee (Oklahoma) Academy of Medicine meeting recently.

The Mid-South Postgraduate Medical Assembly, which met in Memphis recently, installed Dr. H. King Wade, Hot Springs National Park, as President.

Dr. R. B. Robins, Camden, was recently elected Vice-President for Arkansas of the Mid-South Postgraduate Assembly.

Dr. Gordon Hastings, Little Rock, has been elected to Fellowship, and Dr. William B. Grayson, Little Rock, has been elected to Associateship, in the American College of Physicians.

Dr. W. R. Brooksher, Fort Smith, Dr. David LeVine, El Dorado, and Dr. D. A. Rhinehart, Little Rock, have been certified as Diplomates by the American Board of Radiology.

Dr. D. W. Fulmer, Little Rock, has been made Director of the Saline County Health Unit, succeeding Dr. C. A. Henry, Clarendon, who recently resigned.

Dr. M. A. Baltz, Pocahontas, recently opened a medical clinic in the Randolph Hotel.

The Johnson County Medical Society held its annual banquet session recently with Dr. G. R. Siegel, Clarksville, acting as toastmaster.

Deaths

Dr. Philip Ross Watkins, Mena, aged 69, died February 24 of pneumonia.

Dr. William Hamilton Miller, Little Rock, aged 67, died January 23 of coronary thrombosis.

Dr. Leslie Alonzo Purifoy, El Dorado, aged 30, died February 1 of coronary embolus as the result of injuries received in an automobile accident.

Dr. John C. Ware, Yellville, aged 85, died recently of heart disease.

Dr. David A. Maxwell, Lockesburg, aged 78, died recently of cerebral hemorrhage.

Dr. Robert S. Medearis, North Little Rock, aged 64, died recently.

Dr. Fred L. Duckworth, Monticello, aged 52, died January 24 of cerebral hemorrhage.

Dr. Edward L. Locke, Hamburg, aged 58, died December 1 of prostatitis.

DISTRICT OF COLUMBIA

The District of Columbia-Maryland-Delaware-Virginia-West Virginia regional meeting of the American College of Surgeons was held in Washington April 11-12 with headquarters at the Mayflower Hotel.

Dr. Elmer V. McCollum, Professor of Biochemistry, Johns Hopkins University, Baltimore, delivered a lecture in the Smith-Reed-Russell series at George Washington University School of Medicine recently.

Dr. Lacy John Salan, Washington, and Miss Marie Cecilia Rowan were married recently.

Deaths

Dr. Marie Burnadette Lucas, Washington, aged 60, died February 23 of purpura hemorrhagica and pulmonary edema.

Dr. William Fowke Ravenel Phillips, Washington, aged 62, died recently.

FLORIDA

Dr. H. Marshall Taylor, Jacksonville, President of the Southern Medical Association, was one of the guest speakers at the meeting of the St. Louis Medical Society in St. Louis on Tuesday, April 23.

The Palm Beach County Medical Society elected the following officers for the coming year: Dr. W. W. George, West Palm Beach, President; Dr. L. M. Rozier, West Palm Beach, Vice-President; Dr. Lloyd J. Netto, West Palm Beach, Secretary; Dr. Fred K. Herpel, West Palm Beach, Treasurer.

The Four County Medical Society elected the following officers for the coming year: Dr. G. L. Harrell, Vero Beach, President; Dr. J. D. Parker, Stuart, Vice-President; Dr. C. L. Davis, Okeechobee, Secretary-Treasurer.

The Walton-Okaloosa County Medical Society elected the following officers for the coming year: Dr. E. L. Huggins, Free-

port, President; Dr. R. B. Spires, DeFuniak Springs, Vice-President; Dr. A. G. Williams, Lakewood, Secretary-Treasurer.

Dr. Eugene G. Peek, Ocala, has been elected President of the Marion County Chamber of Commerce.

The Dade County Medical Society had as guest speaker at a recent meeting Dr. Charles E. Riggs, former Surgeon-General, United States Navy; Dr. Max Cutler, Chicago; Dr. Thomas A. Groover, Washington; and Dr. David Berlin, Boston.

The Florida Society of Dermatology and Syphilology held their fifth annual meeting recently in Miami.

Dr. William G. Doern, DeLand, is at the Doern Clinic, Milwaukee, Wisconsin, engaged in cancer research work.

Dr. Charles E. Boynton, Jr., formerly of Atlanta, has moved to 305 Harvey Building, West Palm Beach.

Dr. Lamar L. Lancaster, Bartow, and Miss Mildred Alberta Dunn were married March 18.

DEATHS

Dr. Horace Lee Simpson, Pensacola, aged 71, died February 4 of cerebral hemorrhage.

Dr. William S. Aldridge, Lake Worth, aged 68, died February 9 of heart disease.

Dr. Chester Edward Logan, Largo, aged 75, died January 18.

Dr. Gaston Holcombe Edwards, Orlando, aged 59, died recently of heart disease.

GEORGIA

The Chattooga County Medical Society elected the following officers for the coming year: Dr. F. W. Hall, Summerville, President; Dr. R. E. Talley, Trion, Vice-President; Dr. H. D. Brown, Summerville, Secretary-Treasurer.

The Cobb County Medical Society elected the following officers for the coming year: Dr. J. W. Ellis, Kennesaw, President; Dr. W. G. Crawley, Jr., Acworth, Vice-President; Dr. W. C. Mitchell, Smyrna, Secretary-Treasurer.

The Thomas County Medical Society elected the following officers for the coming year: Dr. E. F. Wahl, Thomasville, President; Dr. H. A. Ainsworth, Thomasville, Vice-President; Dr. Rudolph Bell, Thomasville, Secretary-Treasurer.

The Gwinnett County Medical Society elected the following officers for the coming year: Dr. W. H. Hutchins, Buford, President; Dr. W. W. Puett, Norcross, Vice-President; Dr. A. D. Williams, Lawrenceville, Secretary-Treasurer.

The Colquitt County Medical Society elected the following officers for the coming year: Dr. T. H. Chesnutt, Moultrie, President; Dr. H. T. Edmondson, Moultrie, Vice-President; Dr. W. R. McGinty, Moultrie, Secretary-Treasurer.

The Terrell County Medical Society elected the following officers for the coming year: Dr. Guy Chappell, Dawson, President; Dr. J. H. Lewis, Dawson, Vice-President; Dr. S. P. Kenyon, Dawson, Secretary-Treasurer.

The Clayton-Fayette Counties Medical Society elected the following officers for the coming year: Dr. J. A. Lester, Fayetteville, President; Dr. H. D. Kemper, Jonesboro, Vice-President; Dr. T. J. Busey, Fayetteville, Secretary-Treasurer.

The Carroll County Medical Society elected the following officers for the coming year: Dr. S. F. Scales, Carrollton, President; Dr. H. L. Barker, Carrollton, Vice-President; Dr. D. S. Reese, Carrollton, Secretary-Treasurer.

The Sumter County Medical Society elected the following officers for the coming year: Dr. J. C. Logan, Plains, President; Dr. A. C. Primrose, Americus, Vice-President; Dr. S. A. Scruggs, Americus, Secretary-Treasurer.

The Turner County Medical Society elected the following officers for the coming year: Dr. H. M. Belflower, Sycamore, President; Dr. F. W. Rogers, Ashburn, Vice-President; Dr. J. H. Baxter, Ashburn, Secretary-Treasurer.

The Hancock County Medical Society elected the following officers for the coming year: Dr. Horace Darden, Sparta, President; Dr. H. L. Earl, Sparta, Secretary-Treasurer.

The Hall County Medical Society elected the following officers for the coming year: Dr. W. R. Garner, Gainesville, President; Dr. E. W. Grove, Gainesville, Vice-President; Dr. Hartwell Joiner, Gainesville, Secretary-Treasurer.

The Jackson-Barrow Counties Medical Society elected the following officers for the coming year: Dr. A. A. Rogers, Commerce, President; Dr. C. B. Lord, Jefferson, Vice-President; Dr. J. T. Stovall, Jefferson, Secretary-Treasurer.

The Washington County Medical Society elected the following officers for the coming year: Dr. S. B. Malone, Sandersville, President; Dr. N. J. Newsom, Sandersville, Vice-President; Dr. O. D. Lennard, Tennille, Secretary-Treasurer.

The Cherokee County Medical Society elected the following officers for the coming year: Dr. R. M. Moore, Waleska, President; Dr. N. J. Coker, Canton, Vice-President; Dr. G. C. Brooke, Canton, Secretary-Treasurer.

The Dooley County Medical Society elected the following officers for the coming year: Dr. H. A. Mobley, Vienna, President; Dr. M. L. Malloy, Vienna, Secretary-Treasurer.

The Elbert County Medical Society elected the following officers for the coming year: Dr. F. A. Smith, Elberton, President; Dr. W. A. Johnson, Elberton, Vice-President; Dr. A. S. Johnson, Elberton, Secretary-Treasurer.

The Upson County Medical Society elected the following officers for the coming year: Dr. R. L. Carter, Thomaston, President; Dr. J. E. Garner, Thomaston, Vice-President; Dr. John D. Blackburn, Thomaston, Secretary-Treasurer.

The Burke County Medical Society elected the following officers for the coming year: Dr. J. M. Byne, Jr., Waynesboro, President; Dr. W. R. Lowe, Midville, Vice-President; Dr. R. L. Miller, Waynesboro, Secretary-Treasurer.

The Atlanta Tuberculosis Association, at its annual meeting, held on February 21, elected Dr. C. C. Aven, Atlanta, President.

Dr. Albert Fleming, Folkston, entertained at a shad supper recently for the members of the Ware County Medical Society.

Dr. W. M. Scott, Milledgeville, has just opened a new private hospital.

Dr. Martin T. Meyers and Miss Marjorie Marvin Wyley, both of Atlanta, were married February 27.

Dr. DeWitt T. Bond, Danielsville, and Miss Elsie Quattlebaum were married recently.

Dr. Robert M. Harbin, Jr., and Miss Charlotte Dean, both of Rome, were married February 16.

DEATHS

Dr. Moses Gatlin Campbell, Atlanta, aged 73, died February 8 of heart disease.

Dr. William L. Bowers, Vada, aged 68, died February 8 of cerebral hemorrhage.

Dr. Joseph M. Page, Dublin, aged 74, died December 14 of cerebral hemorrhage.

Dr. Rankin Robert Lowery, Augusta, aged 43, died December 23 of encephalitis.

Dr. Ernest Lacy Smith, Eastman, aged 59, died January 28 of cerebral hemorrhage.

Dr. John H. Hendrix, Hawkinsville, aged 57, died January 24 of influenza and heart disease.

Dr. Joseph L. Murdoch, Emerson, aged 72, died January 29 of lobar pneumonia.

Dr. Truitt H. Nelson, Alamo, aged 52, died February 3.

Dr. John Mitchell Rogers, Barnesville, aged 60, died February 28 of pneumonia.

Dr. William L. Bowers, Camilla, aged 69, died February 8.

KENTUCKY

Dr. Irvin Abell, Louisville, a Past-President of the Southern Medical Association and a member of the Board of Trustees, was one of the guest speakers on the program of the St. Louis Medical Society at St. Louis on Tuesday, April 23.

DEATHS

Dr. John H. Samuel, Maysville, aged 79, died February 18 of pneumonia.

Dr. John Inman Smith, London, aged 68, died February 17 of heart disease.

Dr. Hershell M. Earle, Berry, aged 72, died February 16 of angina pectoris.

Dr. John Rowan Morrison, Louisville, aged 57, died January 8 of arteriosclerosis.

Dr. Walter R. Ray, Shelbyville, aged 74, died February 4 of heart disease.

Dr. Joseph W. Bryan, Lexington, aged 85, died February 8 of bronchopneumonia.

LOUISIANA

The Louisiana State Medical Society held their annual meeting in New Orleans April 29, 30 and May 1.

Dr. Randolph Lyons, New Orleans, was recently elected President of the Interurban Clinical Club.

Dr. Henry W. E. Walther, Urologist to the Southern Baptist Hospital, New Orleans, was guest speaker at the annual meeting of the Alabama Urological Association held at Mobile, Alabama, on April 16.

DEATHS

Dr. Paul Lawrence, Haughton, aged 95, died recently of angina pectoris.

Dr. Clarence Pierson, Pineville, aged 66, died recently of carcinoma of the stomach.

Dr. L. L. Rabouin, New Orleans, aged 69, died February 25.

Dr. John Smyth, New Orleans, aged 66, died February 25.

Dr. Charles A. Borey, New Orleans, aged 63, died February 27.

Continued on page 20

VITAMINS

CONTAINED IN BREWERS' YEAST ARE NECESSARY FOR NORMAL FUNCTION *of* GASTRIC GLANDS

In experiments by WEBSTER AND ARMOUR on Vitamine-B and gastric secretion, they state: (Proc. Exp. Biol. & Med., Jan. '34) "Administration of powdered brewers' yeast restored the normal secretory activity of the stomach in 3 days. This indicated that for the normal activity of the gastric glands it is necessary that the vitamins contained in yeast, presumably vitamin B complex, be present in the body."

PEMBERTON & OSGOOD (Chronic Arthritis—MacMillan & Co., 1934) state that . . . "there is general agreement that lack of vitamin B in animals leads to, among other changes, atrophy of the mucous and muscular layers of the gastro-intestinal tract . . ."

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Continued from page 488

MARYLAND

Dr. Winford H. Smith, Johns Hopkins Hospital, Baltimore, has been named Chairman of an advisory committee for the newly created municipal Department of Welfare of Baltimore.

The Johns Hopkins University School of Medicine, Baltimore, has received an additional gift of $150,000 from the Joseph Raphael DeLamar Estate.

DEATHS

Dr. John Ruhrah, Baltimore, aged 62, died March 10 of arteriosclerotic hypertensive cardiovascular disease and cerebral hemorrhage.

Dr. James A. Melvin, Baltimore, aged 71, died recently.

Dr. Melvin Samuel Rosenthal, Baltimore, aged 65, died February 16 of carcinoma of the rectum.

Dr. John Davis Dabney Ware, Baltimore, aged 31, died February 23 of heart disease.

Dr. Otho H. Williams Ragan, Hagerstown, aged 81, died January 15 of pneumonia.

Dr. Milton D. Norris, Eldersburg, aged 63, died February 17 of heart disease.

Dr. Philip Elwood Stigers, Hancock, aged 70, died January 29 of heart disease.

Dr. Henry Maynadier Fitzhugh, Westminster, aged 59, died January 25 of acute streptococcic osteomyelitis of the femur.

MISSISSIPPI

The Mississippi State Medical Association will hold their sixty-eighth annual meeting at Biloxi May 14, 15 and 16.

Dr. J. D. Biles, Sumter, recently entertained a good many of the Coahoma County physicians at a quail dinner.

Dr. E. LeRoy Wilkins, Clarksdale, recently took a postgraduate course at George Washington University, St. Louis, in eye, ear, nose and throat.

Dr. I. P. Burdine, Jr., formerly of Sanatorium, is now located in Amory.

Dr. Homer Whittington, Natchez, and Miss Elizabeth Wood were married recently.

DEATHS

Dr. L. H. Lamkin, Natchez, aged 76, died February 17.

Dr. W. A. Carpenter, Greenville, aged 50, died recently.

Dr. William A. Powel, Hernando, aged 72, died January 5 of injuries received in an automobile accident.

Dr. Charles H. Teasdale, Crystal Springs, aged 90, died January 21 from burns received when his clothing became ignited from an open fireplace.

Dr. William Marlin Marsh, Ripley, aged 50, died February 24 of pneumonia.

MISSOURI

The St. Louis Medical Society had as guest speakers at their meeting on April 23 three officers of the Southern Medical Association: Dr. H. Marshall Taylor, Jacksonville, Florida, President of the Association; Dr. Irvin Abell, Louisville, Kentucky, a Past-President and member of the Board of Trustees; and Dr. M. Pinson Neal, Columbia, Missouri, Member of the Council from Missouri.

The Missouri State Medical Association will hold their seventy-eighth annual meeting at Excelsior Springs May 6, 7, 8 and 9 with headquarters at the Elms Hotel.

The Cooper County Medical Society elected the following officers for the coming year: Dr. J. O. Boley, Pilot Grove, President; Dr. Charles Sandy, Pilot Grove, Vice-President; Dr. J. C. Tincher, Boonville, Secretary-Treasurer.

The Cape Girardeau County Medical Society elected the following officers for the coming year: Dr. D. I. L. Seabaugh, Jackson, President; Dr. P. W. Nussbaum, Cape Girardeau, Vice-President; Dr. C. A. W. Zimmermann, Cape Girardeau, Secretary; Dr. B. W. Hays, Jackson, Treasurer.

The South Central Counties Medical Society elected the following officers for the coming year: Dr. D. D. Cox, Pomona, President; Dr. A. H. Thornburgh, West Plains, Vice-President; Dr. A. C. Ames, Mountain Grove, Secretary-Treasurer.

The Cass County Medical Society elected the following officers for the coming year: Dr. William Beckman, Strasburg, President; Dr. B. B. Tout, Archie, Vice-President; Dr. J. S. Triplett, Harrisonville, Secretary-Treasurer.

The Bates County Medical Society elected the following offi-

Continued on page 22

HARVARD MEDICAL SCHOOL

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Common Problems of Internal Medicine
June 19-July 31 (6 weeks). Massachusetts General Hospital. Fee, $200.

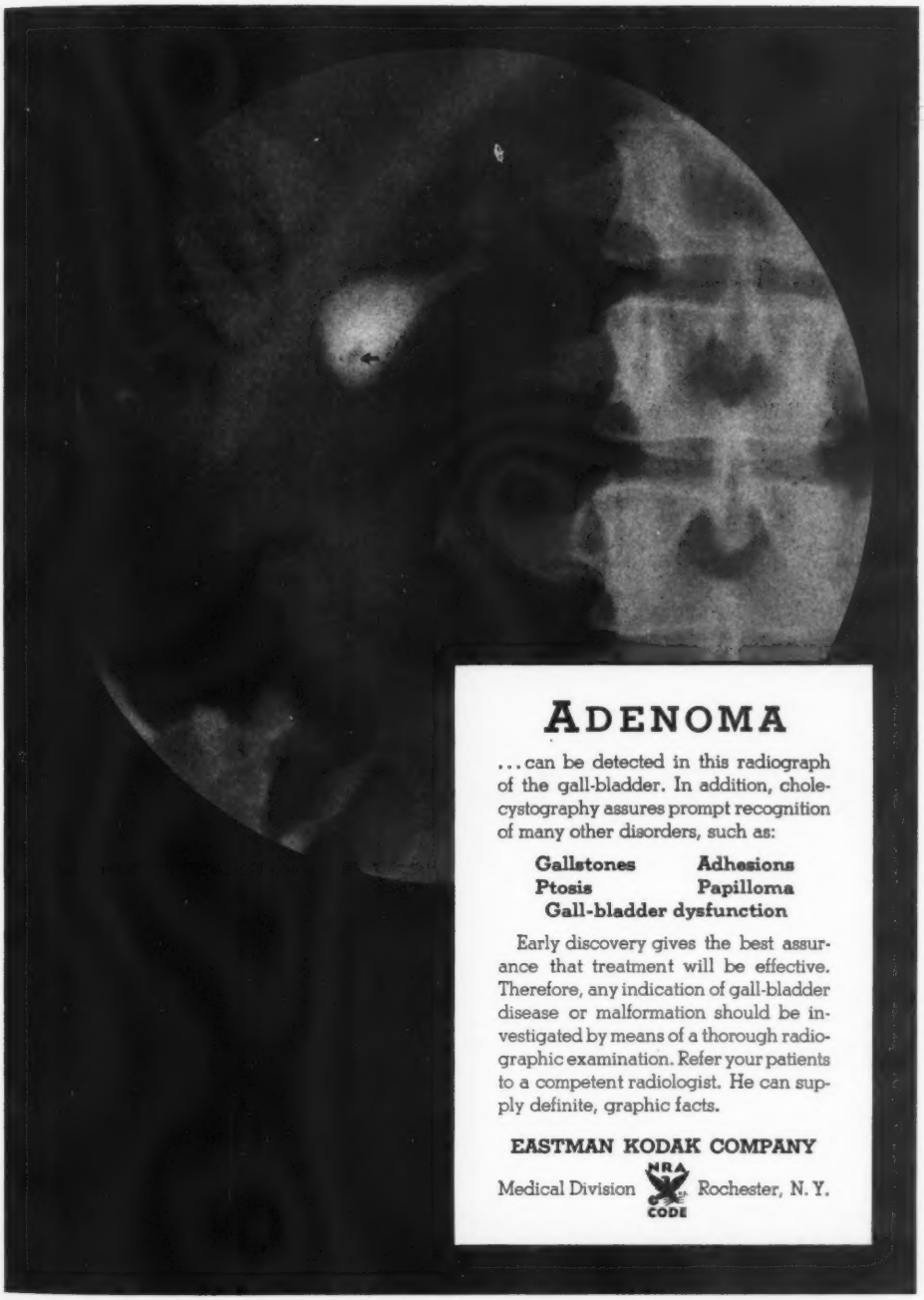
Modern Diagnosis and Treatment of Heart Disease
July 1-31. Peter Bent Brigham Hospital. Fee, $125.

Pediatrics
July 1-31. Fee, $125.

Minor Surgery, Designed for Practitioners
July 1-31. Boston City Hospital. Fee, $150.

Cardiology — Advanced Cardiology
Cardiology, August. Advanced Cardiology, September. Fee, $150 per course.

For further information regarding the above courses apply to Assistant Dean Courses for Graduates, HARVARD MEDICAL SCHOOL, Boston, Mass.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Continued from page 20

cers for the coming year: Dr. G. A. Delameter, Butler, President; Dr. R. H. Smith, Rich Hill, Secretary.

Dr. John R. Caulk and Dr. Quitman U. Newell, St. Louis, were guest speakers at a recent meeting of the Adams County (Illinois) Medical Society at Quincy.

Dr. Edwin L. Sheahan, Clayton, has been appointed Health Commissioner of St. Louis County, succeeding Dr. L. C. Obrock.

DEATHS

Dr. William Frederich Marten, Ferguson, aged 46, died December 31.

Dr. Charles L. Allen, Cosby, aged 61, died recently of arteriosclerosis.

Dr. Christopher C. Banta, Coal, aged 68, died recently of carcinoma of the sigmoid.

Dr. Samuel A. Poague, Clinton, aged 69, died February 17 of senile dementia.

Dr. Oran D. McCray, Marshall, aged 58, died recently of carcinoma of the liver and diabetes mellitus.

Dr. William Henry Foster, St. Louis, aged 59, died February 9 of pneumonia.

Dr. Hugh Smith Rowlett, Maryville, aged 65, died February 18 of arteriosclerosis and uremia.

Dr. Jabez North Jackson, Kansas City, aged 66, died March 18.

Dr. John Harvey Graff, Perryville, aged 41, died January 6 following a thyroidectomy.

Dr. Albert James Welch, Kansas City, aged 67, died recently of coronary heart disease.

NORTH CAROLINA

The Johnston County Medical Society elected the following officers for the coming year: Dr. J. H. Fitzgerald, Smithfield, President; Dr. B. L. Aycock, Princeton, Vice-President; Dr. C. C. Massey, Smithfield, Secretary.

The Second District Medical Society elected the following officers for the coming year: Dr. N. M. Gibbs, New Bern, President; Dr. Lewis H. Swindell, Washington, Vice-President; Dr. Charles H. Ashford, New Bern, Secretary.

The Durham-Orange County Medical Society was addressed recently by Dr. W. L. Bierring, Des Moines, Iowa, President of the American Medical Association.

Dr. Wilson G. Smillie, of the Harvard School of Public Health, Boston, Massachusetts, lectured to the students of Duke University recently.

Dr. Lawrence M. Caldwell, Newton, and Miss Macel Ratchford were married January 4.

Dr. Powell W. Joyner and Miss Dorothy Marion Dunn, both of Enfield, were married March 9.

DEATHS

Dr. J. Vance McGougan, Fayetteville, aged 65, died March 13 of influenza.

Dr. Edwin Lamar Nichols, Raleigh, aged 25, died March 5 of septicemia.

OKLAHOMA

The Pawnee County Medical Society elected the following officers for the coming year: Dr. R. L. Browning, Pawnee, President; Dr. C. E. Baum, Jennings, Vice-President; Dr. E. W. LeHew, Pawnee, Secretary-Treasurer.

The Kingfisher County Medical Society elected the following officers for the coming year: Dr. Frank Scott, Kingfisher, President; Dr. B. D. Townsend, Hennessey, Vice-President; Dr. F. C. Lattimore, Kingfisher, Secretary-Treasurer.

The Muskogee Academy of Medicine sponsored a two-day medical assembly recently, some of the speakers being: Dr. Ernest Sachs, St. Louis; Dr. William T. Pride, Memphis; Dr. John O. McReynolds, Dallas; Dr. Arthur G. Schoch, Dallas; Dr. Barton A. Rhinehart, Little Rock; and Dr. Sidney J. Wolfermann, Fort Smith, Arkansas.

Dr. Charles M. Pearce, McAlester, has been selected State Health Commissioner.

DEATHS

Dr. Irving S. Freeman, Rocky, aged 49, died recently of bronchopneumonia.

Dr. Isaiah Thomas Harbour, Cowlington, aged 82, died January 11 of adenocarcinoma of the pancreas.

Continued on page 24

THE NEW YORK POLYCLINIC

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Dallas, Texas

Continued from page 22

Dr. James A. Humphrey, Martha, aged 70, died February 17 of hypertension and myocarditis.

Dr. Harry Clifford Antle, Chickasha, aged 52, died February 7 of hepatic cirrhosis.

Dr. Perry Edgar Mitchell, Wetumpka, aged 54, died February 16 of cerebral hemorrhage.

Dr. Joseph B. McClure, Norman, aged 72, died in February of coronary thrombosis.

Dr. Eli Lide Dawson, Chickasha, aged 79, died February 8.

SOUTH CAROLINA

The South Carolina Medical Association held its annual meeting in Florence April 23, 24 and 25 with headquarters at the Florence Hotel.

Dr. John M. Brewer, Kershaw, and Miss Jean Culvern were married January 12.

Deaths

Dr. Charles D. Napier, Blenheim, aged 58, died January 7.

Dr. Thomas Hayne Wedaman, Johnston, aged 52, died January 9.

Dr. Frank M. Durham, Columbia, aged 59, died February 1 of injuries received when struck by an automobile.

TENNESSEE

Governor Hill McAlister has appointed the following State Board of Health: Dr. John M. Lee, Nashville, for a term of three years; Dr. Owen A. Oliver, Nashville, for a term of two years; Dr. E. M. Fuqua, Pulaski, for a term of one year; Dr. L. F. Mitchell, Nashville, for a term of one year; Dr. W. K. Vance, Jr., Bristol, for a term of three years; Dr. J. R. Thompson, Jr., Jackson, for a term of two years; Dr. C. P. Fox, Sr., Greenville, for a term of one year; Dr. J. C. Ayres, Memphis, for a term of three years.

The Dickson County Medical Society elected the following officers for the coming year: Dr. L. F. Loggins, Charlotte, President; Dr. R. P. Beasley, Dickson, Secretary-Treasurer.

Continued on page 26

THE JEFFERSON MEDICAL COLLEGE of PHILADELPHIA

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FOUNDED 1825. A Chartered University Since 1838. Graduates number 15,900.

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ADMISSION: A college degree based on four years of college work, including certain specified science and language courses, is required.

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UNIVERSITY of MARYLAND, SCHOOL of MEDICINE and COLLEGE of PHYSICIANS and SURGEONS

Requirements for Admission—Two years of college work, including English, Chemistry, Biology, Physics and one year in a modern foreign language, in addition to an approved four year high school course.

Facilities for Teaching—Abundant laboratory space and equipment. Two large general hospitals absolutely controlled by the faculty and several hospitals devoted to specialties, in which clinical teaching is done.

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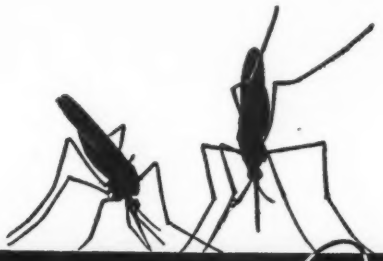

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(B. A. CULTURE)

Experience has amply demonstrated the value of viable cultures of lactic acid bacilli in the various infections of the tract and in the long train of conditions having their origin therein.

B. B. CULTURE and BACILLUS ACIDOPHILUS CULTURE (B. A. CULTURE) in the convenient 4-ounce size are well known throughout the South. They are available at the leading prescription pharmacies or direct from the laboratory.

Samples and literature on request

B. B. Culture Laboratory, Inc.
Yonkers, N. Y.

(Producers of lactic cultures since 1910.)

Continued from page 24

The Hamblen County Medical Society elected the following officers for the coming year: Dr. P. L. Henderson, Morristown, President; Dr. P. L. Brock, Morristown, Vice-President; Dr. J. F. Campbell, Morristown, Secretary-Treasurer.

The Hickman County Medical Society elected the following officers for the coming year: Dr. L. F. Pritchard, Only, President; Dr. W. K. Edwards, Centerville, Secretary-Treasurer.

The Lauderdale County Medical Society elected the following officers for the coming year: Dr. J. L. Dunnavant, Ripley, President; Dr. J. R. Lewis, Ripley, Secretary-Treasurer.

The McNairy County Medical Society elected the following officers for the coming year: Dr. John R. Smith, Selmer, President; Dr. G. B. Curry, Selmer, Vice-President; Dr. H. C. Sanders, Selmer, Secretary-Treasurer.

The Tipton County Medical Society elected the following officers for the coming year: Dr. A. J. Butler, Covington, President; Dr. J. J. Fleming, Atoka, Vice-President; Dr. H. C. Currie, Covington, Secretary-Treasurer.

Dr. Maurice Brodie, New York, addressed the students of Vanderbilt University School of Medicine recently.

Dr. Carl R. Crutchfield, Nashville, was elected President-Elect of the Mid-South Postgraduate Medical Assembly, which met in Memphis February 12-15.

Dr. R. Z. Linney, formerly of Boone, North Carolina, has moved to Madison.

Deaths

Dr. James E. W. Price, Kingston, aged 68, died recently.

Dr. Thomas Nathan Eblen, Orme, aged 62, died January 5 of pneumonia.

Dr. H. S. Copeland, Dresden, aged 66, died January 28.

Dr. William Cornelius Pressly, Troy, aged 77, died February 18 of arteriosclerosis.

Dr. James L. Alexander, Hartsville, aged 83, died January 7.

Dr. James Lundie Barton, Memphis, aged 67, died January 6.

Dr. William Melvin Ramsay, Jonesboro, aged 75, died February 14 of senile gangrene and hypostatic pneumonia.

Dr. Robert M. Kendrick, Selmer, aged 64, died February 20 of pneumonia.

Continued on page 28

Gain in Weight

In the feeding of the normal baby it is customary to use 6 level tablespoonfuls of Mellin's Food in preparing the daily mixture, which furnishes 150 calories in addition to the calories supplied by the milk.

The underweight baby requires food of a higher caloric value and is likely to respond with a prompt gain in weight if the source of the additional calories is largely *maltose, the predominating carbohydrate in Mellin's Food.*

Where a gain in weight is especially desired and it is deemed advisable to build up the caloric value of the daily intake by increasing the carbohydrate content, it is well to have in mind that maltose has a high point of assimilation and that Mellin's Food may be given in increasing amounts until the gain in weight is well established.

Mellin's Food ACCEPTED AMERICAN MEDICAL ASSOCIATION Commission on Foods **Milk Modifier**

Produced by an infusion of Wheat Flour, Wheat Bran and Malted Barley admixed with Potassium Bicarbonate—consisting essentially of Maltose, Dextrins, Proteins and Mineral Salts.

Samples and literature sent to physicians upon request.

Directions for using Mellin's Food are left entirely to the physician.

Mellin's Food Company - - - Boston, Mass.

4 HOURS in an INFANT'S STOMACH

Feedings which stay longer than 4 hours in an infant's stomach are said to be delayed. In artificially fed cases this delay is often due to the large size and toughness of the cow's milk curd which not only resists the action of the gastric juice but also gastric peristalsis.

KLIM, a dry powder, is whole milk with only the water removed. It provides the infant with *all* the solid milk elements — proteins, butterfat, minerals, vitamins — in more digestible and more assimilable form.

KLIM feedings quickly leave the stomach and are rapidly utilized because KLIM is so readily digested. Soft, easily friable curd, and butterfat emulsification comparable with breast milk are reasons why infants tolerate KLIM so well.

Safety and Economy. On the pantry shelf, KLIM retains its original high purity until used. No waste. Only the exact needed amount of powder is reliquefied daily. No bacterial hazard where refrigeration is absent or uncertain.

Admirably adapted to the doctor's own formulas for individual needs.

Send for sample, literature on infant feeding and handy feeding schedule. They will be sent promptly on request.

ACCEPTED AMERICAN MEDICAL ASSN Committee on Foods

KLIM

THE BORDEN COMPANY
Dept. 264, 350 Madison Ave., New York City

Please send me KLIM literature and pocket formula calculator. Check here to receive samples. ☐

..... M.D.

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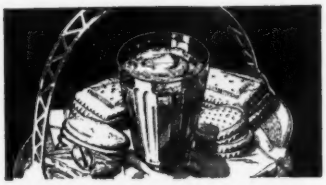
City ..... State .....

In Convalescence



Recovery after illness or operations is greatly aided through the use of Horlick's Malted Milk with its remarkably nourishing and easily digestible qualities. It is readily prepared, appetizing, and particularly well suited for cases in which frequent small, light meals are indicated.

[Horlick's Malted Milk Tablets offer a pleasing variety in liquid diet.]

HORLICK'S MALTED MILK CORP.
RACINE, WIS.

Continued from page 26

Dr. Francis Adams McClintock, Newcomb, aged 73, died February 18 of pneumonia.

Dr. William H. Delap, LaFollette, aged 60, died February 22 of streptococcic cellulitis.

TEXAS

The Milam County Medical Society elected the following officers for the coming year: Dr. Edward Rischar, Cameron, President; Dr. J. L. Denson, Cameron, Vice-President; Dr. G. B. Taylor, Cameron, Secretary.

The Hays-Blanco Counties Medical Society elected the following officers for the coming year: Dr. W. C. Williams, San Marcos, President; Dr. J. R. Morton, San Marcos, Vice-President; Dr. J. R. deSteiguer, San Marcos, Secretary-Treasurer.

The Hunt-Rockwall-Rains Counties Medical Society elected the following officers for the coming year: Dr. P. W. Pearson, Emory, President; Dr. W. M. Dickens, Greenville, Vice-President; Dr. M. L. Wilbanks, Greenville, Secretary-Treasurer.

The Brooks-Duval-Jim Wells Counties Medical Society elected the following officers for the coming year: Dr. N. W. Atkinson, Alice, President; Dr. C. Lamar Behrns, Alice, Vice-President; Dr. George Wyche, Alice, Secretary.

The Bowie County Medical Society elected the following officers for the coming year: Dr. Roy F. Baskett, Texarkana, President; Dr. E. M. Watts, Texarkana, Vice-President; Dr. R. C. Cross, Texarkana, Secretary-Treasurer.

Dr. B. L. Jordan, Daisetta, has been appointed County Health Officer for Liberty County.

Dr. Edward Randall, Galveston, was recently reappointed to the Board of Regents of the University of Texas.

Dr. George A. Gray, Abilene, is in Baltimore taking postgraduate work.

Dr. E. W. Jones, Wellington, is in Chicago taking postgraduate work in surgical clinics.

Dr. T. A. King, Vernon, has returned from Chicago, where he was doing postgraduate work in surgery.

Dr. Tom E. Smith, Dallas, has returned from a six months'

Continued on page 30

MAINTAIN MINERAL ALKALI BALANCE WITH KALAK

Hypertonic — Alkaline — Carbonated — Not Laxative

The years of experience with physicians who have used Kalak show that the use of a formula containing calcium, magnesium, sodium and potassium salts represents a correctly balanced solution. This is Kalak which, as such, aids in maintaining a balanced base reserve.

How Alkaline Is Kalak?

One liter of Kalak requires more than 700 cc. N/10 HCl for neutralization of bases present as bicarbonates. Kalak is capable of neutralizing approximately three-quarters its volume of decinormal hydrochloric acid.

KALAK WATER CO. OF NEW YORK, Inc.
6 CHURCH STREET NEW YORK CITY

kalak

We quote from page 54 of

"The Milk Question"

by M. J. ROSENAU, Professor of Preventive Medicine and Hygiene, Harvard Medical School.

"Man has but a single stomach and this forms about twenty per cent of the digestive tract. The cow has four stomachs which form about seventy percent of the digestive tract. The calf's stomach is well fitted to handle and digest the tough, lumpy curds which form from cow's milk. Woman's milk curdles into a soft mass which is broken into numberless small particles. Evidently the stomach of the infant fed with cow's milk is over-taxed trying to break the tough curds into particles small enough for complete digestion. It is therefore evident that even if we could secure cow's milk, the chemical composition of which was exactly the same as that of human milk, it would still be far from a perfect substitute unless it behaved similarly in the digestive tract."

SIMILAC is similar to breast milk not only in composition but in digestive properties as well. Like breast milk it forms an extremely fine, soft curd of consistently zero curd tension.

ACCEPTED AMERICAN MEDICAL ASSN. Committee on Foods

Not advertised to the laity and no directions on or in the trade package. Samples for curd tests or trial feedings, literature and recorded results of feeding with SIMILAC will be mailed on receipt of a request on your prescription blank.

SIMILAC *is made from fresh skim milk (casein modified) with added lactose, salts, milk fat, and vegetable and cod liver oils.*

M & R
DIETETIC LABORATORIES, INC.,
COLUMBUS, OHIO.

Trademark Registered **STORM** Trademark Registered

Binder and Abdominal Supporter

This Photo Shows Type "N"

Gives perfect uplift and is worn with comfort. Made of Cotton, Linen or Silk, washable as underwear.

Three distinct types of Storm Supporters — many variations of each type.

STORM supporters are made for all conditions needing abdominal uplift. Ptosis, Hernia, Pregnancy, Obesity, Relaxed Sacro-Iliac, Articulations, Kidney Conditions, Post-Operative Support, etc.

Each Belt Made to Order **Ask for Literature**

KATHERINE L. STORM, M.D.
Originator, Owner and Maker
1701 Diamond St. **Philadelphia**

The "MESCO" Laboratories manufacture the largest line of Ointments in the world. Sixty different kinds. We are originators of the Professional Package. Specify "MESCO" when prescribing ointments. Send for lists.

Manhattan Eye Salve Co.
LOUISVILLE, KENTUCKY

Classified Advertisements

ALCOHOLISM (30 years' experience)—THE STOKES HOSPITAL, 923 Cherokee Road, Louisville, Kentucky. Telephone, East 1488. Absolute privacy. Treatment one of gradual reduction. Do not limit the quantity of whiskey used in treatment. Each patient treated as an individual case. Craving for alcoholic beverages destroyed; no physical injury incurred. Rates and folder on request.

ASSISTANCE OFFERED TO MEDICAL WRITERS. Research. Abstracts. Translations (all languages). Papers prepared from author's data. Ten years' experience with leading physicians and appointments on medical journals of the highest standing. I employ no assistants; all my work is done personally and is reliable. Florence Annan Carpenter, 413 St. James Place, Chicago, Ill.

Continued from page 28

trip to Europe, where he studied in clinics and hospitals in London, England, and Vienna, Austria.

Dr. William S. Webb, Fort Worth, has been doing postgraduate work in eye surgery at Shikarpur Sind, India.

Dr. E. B. Boggs, formerly of Spring, has moved to Boling.

Dr. Benjamin H. Carlton, formerly of Hondo, has moved to Port Sulphur, Louisiana.

Dr. T. L. Denson, formerly of Cranfils Gap, has moved to Cameron.

Dr. J. E. Frost, formerly of Beaumont, has moved to New Boston.

Dr. A. M. Gantt, formerly of Gladewater, has moved to Beaumont.

Dr. George H. Garrett, formerly of Glen Rose, has moved to Pecos.

Dr. J. W. Simons, formerly of Gulf, has moved to Newgulf.

Dr. L. T. Waller, formerly of Pickton, has moved to Commerce.

Deaths

Dr. James Monroe Witt, Waco, aged 84, died February 22 of bronchopneumonia and bilateral pyelonephritis.

Dr. Robert Murphy Freeman, Dallas, aged 72, died January 20.

Dr. Thomas Benton Selman, Silsbee, aged 79, died February 1 of pellagra and senile dementia.

Dr. Thomas A. Lowery, Fort Worth, aged 66, died January 18 of pneumonia.

Dr. Charles Virgil Bomar, Newgulf, aged 52, died January 28 of injuries received in an automobile accident.

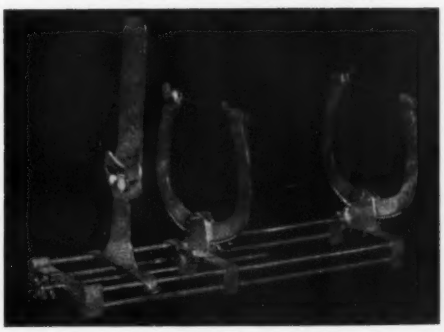
Dr. Oscar L. Norsworthy, San Antonio, aged 63, died January 5 of heart disease.

Dr. William Oscar Sauermann, Houston, aged 67, died recently.

Dr. Sam C. Ball, Texarkana, aged 69, died January 23.

Continued on page 32

OUGHT-O-MATIC LEG SPLINT
—as devised by DR. ROGER ANDERSON—



THE UNIVERSAL SPLINT

Accessories attached to this FRAX-SURE ROBOT permit reduction of the majority of upper and lower extremity fractures.

MECHANICAL REDUCTION
IMMEDIATE AMBULATION
HOSPITALIZATION UNNECESSARY

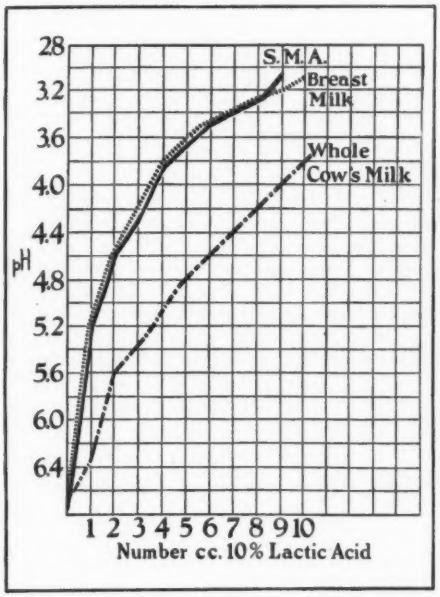
Splint as shown with stainless steel horseshoes, two stainless steel pins and handle $74.00

Two Tautnors for Kirschner wire (when purchased with splint) 24.50

Express prepaid or twenty-four hour delivery via Air Express (we pay one-half) 5% cash discount. Convenient monthly terms arranged. Literature on request.

THE TOWER COMPANY, INC.
1121 Post St. **Seattle, Washington**
—or thru your Dealer—

In BUFFER VALUE *too*, S.M.A. *resembles* BREAST MILK



This buffer chart shows the close similarity between the buffer value of S.M.A. and Breast Milk and the wide difference between cows' milk and Breast Milk. *This also explains why it is not necessary to add an acid to S. M. A.*

Breast Milk from the Normal Mother is the Ideal Food for the Human Infant. That is why S.M.A. is made to resemble breast milk in percentages of carbohydrate, protein, fat and total salts (ash) content, and why even the chemical and physical constants of the fat in S.M.A. are like those of breast milk fat.

This photograph shows the equipment for determining hydrogen ion concentration necessary to plot the Buffer Curve. The chemist drops a measured quantity of acid (from the tall tube in the right foreground) into solution to be tested (in the beaker below) and records the readings from the dial before him.

S.M.A. is a food for infants—derived from tuberculin tested cows' milk, the fat of which is replaced by animal and vegetable fats including biologically tested cod liver oil; with the addition of milk sugar and potassium chloride; altogether forming an antirachitic food. When diluted according to directions, it is *essentially similar to human milk* in percentages of protein, fat, carbohydrates and ash, in chemical constants of the fat and in physical properties.

S. M. A. CORPORATION « ● » CLEVELAND, OHIO

Continued from page 30

VIRGINIA

The Postgraduate Medical Society of Southern Virginia elected the following officers for the coming year: Dr. H. E. Whaley, Victoria, President; Dr. J. A. B. Lowry, Crewe, and Dr. R. H. Manson, McKenney, Vice-Presidents; Dr. C. E. Martin, Emporia, Secretary-Treasurer.

The Warwick County Medical Society elected the following officers for the coming year: Dr. George G. Hankins, Newport News, President; Dr. Edward L. Alexander, Newport News, Vice-President; Dr. Thomas N. Hunnicutt, Newport News, Secretary-Treasurer.

The Bedford County Medical Society elected the following officers for the coming year: Dr. C. H. Bondurant, Bedford, President; Dr. J. A. Rucker, Bedford, Secretary-Treasurer.

The Alleghany-Bath County Medical Society elected the following officers for the coming year: Dr. N. B. Jeter, Covington, President; Dr. A. D. Tyree, Clifton Forge, Vice-President; Dr. R. P. Hawkins, Clifton Forge, Secretary-Treasurer.

The Hanover County Medical Society elected the following officers for the coming year: Dr. I. K. Redd, Ellerson, President; Dr. J. T. Booth, Ashland, Secretary.

The Albemarle County Medical Society has elected the following officers for the coming year: Dr. W. E. Brown, Sanatorium, President; Dr. R. T. Ergenbright, Charlottesville, Vice-President; Dr. Kenneth F. Maxcy, University, Secretary-Treasurer.

The University Medical Society elected the following officers for the coming year: Dr. Tiffany J. Williams, University, President; Dr. Alfred Chanutin, University, Secretary.

The Lynchburg Academy of Medicine elected the following officers for the coming year: Dr. W. C. Adkerson, President; Dr. J. H. Rawlings, Vice-President; Dr. John Hundley, Jr., Secretary-Treasurer.

Dr. C. L. Outland, Richmond, was recently elected Chairman of the Health Council of the Council of Social Agencies of Richmond, Dr. Ennion S. Williams, being elected Vice-Chairman.

Dr. William F. Wild was recently appointed Director of the Isle of Wight-Nansemond-Suffolk Health District, succeeding Dr. C. H. Dawson, who was transferred to the new Peninsula Health District.

Dr. J. Shelton Horsley and Dr. I. A. Bigger, Richmond, each gave a paper at the meeting of the Southeastern Surgical Congress in Jacksonville, Florida, recently.

DEATHS

Dr. James H. Royster, Richmond, aged 43, died March 22 from heart disease. Dr. Royster limited his practice to neurology and psychiatry and at the time of his death was Vice-Chairman and for two years previously had been Secretary of the Section on Neurology and Psychiatry of the Southern Medical Association. He was associated with Dr. J. K. Hall and Dr. Paul V. Anderson at Westbrook Sanatorium.

WEST VIRGINIA

The West Virginia State Medical Association will hold its annual meeting at Wheeling on May 6, 7 and 8.

The Ohio County Medical Society had as guest speaker at a recent meeting Dr. J. W. Lindsay, of Washington, D. C.

The Cabell County Medical Society had as guest speakers at a recent meeting Dr. Karl G. Zwick and Dr. Samuel L. Bauer, both of Cincinnati, Ohio.

The Kanawha County Medical Society had as guest speaker at a recent meeting Dr. J. M. Hutcheson, Richmond, Virginia.

The Monongalia County Medical Society had as guest speaker at a recent meeting Dr. Edwin J. Stedem, Columbus, Ohio.

The Fayette County Medical Society had as guest speaker at a recent meeting Dr. R. R. Sayers, Medical Officer in Charge, Industrial Hygiene and Sanitation, United States Public Health Service, Washington, D. C.

DEATHS

Dr. Lewis Augustus Williams, Huntington, aged 70, died recently of gastric carcinoma.

Dr. Willis S. Michael, Jr., aged 63, died recently of angina pectoris.

Dr. Joseph E. Robins, Charlestown, aged 73, died January 8 of heart disease.

Dr. James I. Miller, Huntington, aged 55, died January 6 of pneumonia as the result of burns received in a gas explosion in the basement of his home.

SCANTY, painful or irregular menstruation usually results in fixed, faulty physiological habits. Treatment is more successful if instituted early.

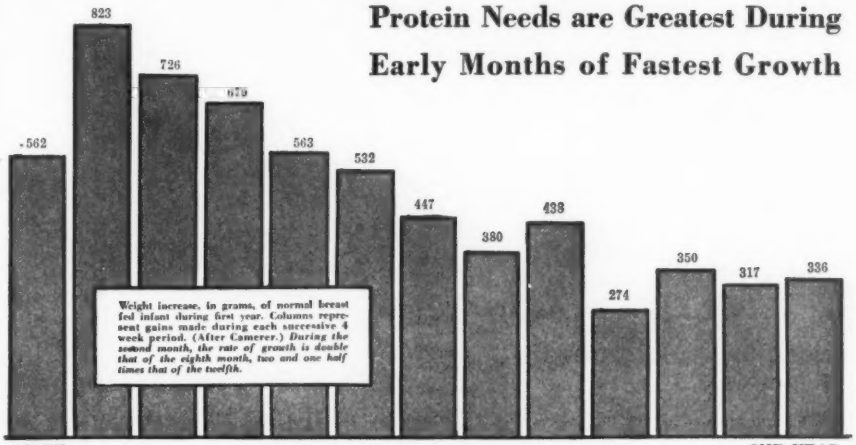
Take advantage of an endocrine product which represents the best thought of research and clinical medicine.

HORMOTONE

BOTTLES OF 50 and 100 TABLETS

G. W. Carnrick Co. 20 Mt. Pleasant Ave. Newark, N. J.

Protein Needs are Greatest During Early Months of Fastest Growth


562
823
726
679
563
532
447
380
438
274
350
317
336
Weight increase, in grams, of normal breast fed infant during first year. Columns represent gains made during each successive 4 week period. (After Camerer.) During the second month, the rate of growth is double that of the eighth month, two and one half times that of the twelfth.
BIRTH
ONE YEAR

DRYCO FEEDINGS OBEY THIS NUTRITIONAL LAW

Higher protein values are indicated during early months of faster growth. *For protein alone builds tissue.* Nature in breast milk postulates this feeding principle.

•

Dryco feedings, unlike ordinary artificial formulas, provide their maximum protein values during these early months.

•

Furthermore, cow's milk protein is biologically inferior to human milk protein. To compensate for this difference, the Dryco formula provides an extra margin of protein at every stage of the nursing period.

•

For sound tissue growth throughout infancy—prescribe Dryco.

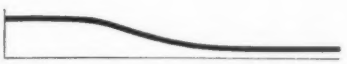
•

We will gladly send upon request, suggested formulas embodying this feeding principle.

The protein value curve of breast milk shows how an initially high protein is provided for early growth needs.

In fluid milk modifications, the protein curve starts low, increasing only as tolerance permits strong milk dilutions.

The fixed analysis of the stock formulas or simulated breast milk foods results in a flat protein value curve.



The protein value of Dryco feedings is initially high to provide for early growth needs. The drying method so increases digestibility that Dryco feedings are well tolerated from the earliest age.

ACCEPTED AMERICAN MEDICAL ASSN. Correspondence on Foods

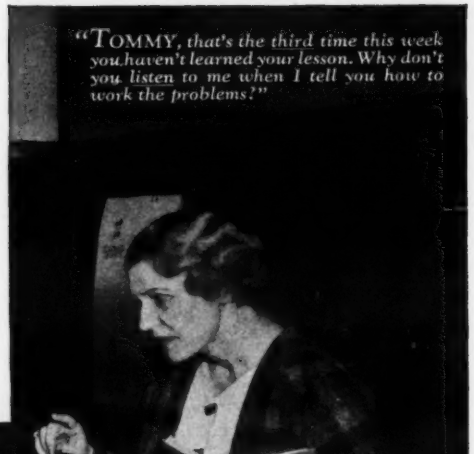
DRYCO

Made from superior quality milk from which part of the butterfat has been removed, irradiated by the ultra-violet ray, under license by the Wisconsin Alumni Research Foundation (U. S. Pat. No. 1,680,818) and then dried by the "Just" Roller Process.

THE DRY MILK COMPANY, INC.

THE DRY MILK CO., INC.
DEPT. SME 350 MADISON AVE., NEW YORK, N. Y.
Please send me DRYCO feeding schedule based on growth requirements.
Check here to receive samples. ☐
..... M.D.
Address .....
City ..... *State* .....

A Poor Scholar . . . because of a Poor Breakfast


"TOMMY, that's the third time this week you haven't learned your lesson. Why don't you listen to me when I tell you how to work the problems?"

MANY a child is scolded for dullness when he should be treated for undernourishment. In hundreds of homes a "continental" breakfast of a roll and coffee is the rule. If, day after day, a child breaks the night's fast of twelve hours on this scant fare, small wonder that he is listless, nervous, or stupid at school.

Pablum offers a happy solution to the problem of the school-child's breakfast. Mothers who learn about Pablum from their physicians are delighted to serve it for it needs no cooking and can be prepared in a minute at the table—more quickly than many less nourishing foods. Pablum not only ends the bane of long cooking of cereals but in addition furnishes a variety of minerals (calcium, phosphorus, iron, and copper) and vitamins (A, B, G, and E) not found so abundantly in any other cereal.

PABLUM is rich in calcium and iron, minerals likely to be deficient in the school-child's diet yet needed in more than average amounts during childhood. Pablum is 6 times richer than fluid milk in calcium and contains 10 times more iron than does spinach. It also furnishes generous amounts of vitamins B and G, essential for normal appetite. Unlike other cereals, Pablum is base-forming, important because the growing child needs to store alkali. The nutritional value of Pablum is attested in studies by Crimm *et al* who found that tuberculous children receiving supplements of Pablum showed greater weight-gain, greater increase in hemoglobin, and higher serum-calcium values than a control group fed farina. Reprint sent on request of physicians. Mead Johnson & Company, Evansville, Ind., U.S.A.

Pablum (Mead's Cereal pre-cooked) is a palatable cereal enriched with vitamin- and mineral-containing foods, consisting of wheatmeal, oatmeal, cornmeal, wheat embryo, alfalfa leaf, beef bone, brewers' yeast, and sodium chloride.

Please enclose professional card when requesting samples of Mead Johnson products to cooperate in preventing their reaching unauthorized persons

Please use postage paid envelope provided to return your comments. Thank you.

23 Years' Clinical Experience Proves Merit of Dextri-Maltose

Continued down from 1911

1926

"It is inadvisable to give more than 7% of milk sugar continuously in an infant's food. Larger amounts may, however, be given safely for considerable periods, when, for any reason, it is necessary to keep one or more of the food elements low. Eventually, however, fermentation, with diarrhea, is almost certain to develop. If larger amounts of sugar than 7% are desirable for any reason, it is usually better to give part of the sugar in the form of one of the combinations of maltose and the dextrins, which are more quickly absorbed and consequently less likely to cause fermentation. Milk sugar is never found in the urine or feces under normal conditions, unless more than 7% of sugar is given. It is true that the assimilation limit of milk sugar is lower than that of the other disaccharides, but this limit is far above the amount which is present in any reasonable mixture. It was said that lactose caused fever more readily than the other sugars. It having been proved, however, that 'sugar fever' is not caused by sugar, it is evident that this statement is of no importance. Gain in weight is for a time more rapid with maltose and saccharose than with lactose, because of the easier assimilation and more rapid absorption of these sugars, which influences the quantity of water eliminated by the kidneys. Lactose, in reasonable amounts, under normal conditions, has a slight laxative effect, as does maltose, while saccharose is slightly constipating. When given in excess, lactose is more likely than the other disaccharides to cause diarrhea, probably because of its relatively slow absorbability. The order is lactose, saccharose, maltose and the dextrin-maltose mixtures. The larger the proportion of maltose in these dextrin-maltose mixtures, the more likely are they to be laxative in action."—*J. L. Morse: Clinical Pediatrics, W. B. Saunders Co., Phila., 1926, p. 159.*

1926

"If there is an improvement in the bowel movements carbohydrate may be added. Again following the teaching of the originator of protein milk, the carbohydrate added should be the one that is most easily assimilated. Dextri-maltose is therefore the carbohydrate of choice."—*Summer diarrheas in the young, International Med. Digest, 9:111-118, Aug. 1926.*

1927

"The milk might be skimmed or whole, and carbohydrate, preferably in the form of dextri-maltose, added as considered necessary."—*L. Thatcher, in a discussion of paper by H. C. Cameron: A discussion on therapeutic modification on the diet in infancy, Brit. M. J. 2:1171-1174, Dec. 24, 1927.*

1927

"It is generally accepted that cow's milk without modification is not a satisfactory infant food. So far as the carbohydrate is concerned, about one-fifth to one-eighth ounce per pound of infant's body weight is required daily. To supply this amount it is necessary to add carbohydrates in some form. Admitting that lactose is the sugar supplied in human milk, it does not follow that it is the sugar best tolerated in another medium, such as cow's milk. It is generally believed that lactose is more laxative than sucrose—that it must be fed with a certain amount of caution, as fermentative upsets are likely to follow if amounts approximating that found in human milk are fed. . . . The dextrin-maltose preparations possess certain advantages. When they are added to cow's milk mixtures, we have a combination of three forms of carbohydrates, lactose, dextrin and maltose, all having different reactions in the intestinal tract and different absorption rates. Because of the relatively slower conversion of dextrins to maltose and then to dextrose, fermentative processes are less likely to develop. Those preparations containing relatively more maltose are more laxative than those containing a higher percentage of dextrin (unless alkali salts such as potassium salts are added). It is common experience clinically that larger amounts of dextrin-maltose preparations may be fed as compared with the simple sugars. Obviously, when there is a lessened sugar tolerance such as occurs in many digestive disturbances, dextrin-maltose compounds may be used to advantage."—*Queries & Minor Notes: Maltose or lactose in infant feeding. J.A.M.A. 88:266, Jan. 22, 1927.*

1927

"Maltose and dextrin compounds are of practical value when large amounts of cane or milk sugar are not well taken."—*J. H. Hess: Infant feeding—its present status, J. Indiana M. A. 20:419-422, Nov. 1927.*

1927

"Maltose ingested as such becomes at once dextrose and dextrose which is the most easily absorbed of the sugars."—*L. T. Royster: Nutrition and Development, Clinical Pediatrics, D. Appleton & Co., New York, 1927, vol. 10, p. 35.*

1927

"The simpler sugars—glucose, ordinary cane sugar, milk sugar, etc., cause acid fermentation in the bowel and have a definitely laxative tendency, which may, when carried to excess, cause severe intestinal irritation.

"The more complex carbohydrates, of which dextrin is the type, ferment more gradually and do not have this laxative effect."

Regarding the treatment of diarrhea, "In our experience, the most satisfactory carbohydrate for routine use is Mead's dextri-maltose No. 1."—*F. R. Taylor: "Summer Complaints," Southern Med. & Surg., pp. 555-559, Aug. 1927.*

1927

". . . I begin to add carbohydrates slowly, by replacing ¼ ounce Casec every two days with ¼ ounce of Dextri-Maltose, preferably Dextri-Maltose Number one. As a rule, this is tolerated. When one ounce of Dextri-Maltose is used, the Casec, of course, should be discontinued."—*J. W. Reed: The etiology and treatment of diarrhoeas of infancy, Virginia M. Monthly, 53:732-735, Feb. 1927.*

1927

"Maltose Dextrin.—This is most easily digested.

"Laxative Properties of Sugar.—All sugars generally are laxative. The addition of an alkali to a maltose dextrin compound has a laxative effect. (A certain preparation of dextri-maltose numbers I and II are constipating. Dextri-maltose number III, with potassium carbonate, an alkali, is laxative.)"

"Dextri-maltose number I is the preparation of choice."—*A. J. Bell: Feeding, Diet and the General Care of Children, F. A. Davis Co., Phila., 1927, p. 44.*

1928

"Dextri-Maltose (Mead's) has been more satisfactory in my hands. The No. 1 and No. 2 are somewhat constipating, where the No. 3 is somewhat laxative. You have here a sugar which may be used with advantage according to the nature of your feeding case."—*K. M. Jarrell: Infant feeding, West Virginia M. J. 24:385-389, Aug. 1928.*

1928

"When there is an indigestion from the fermentation of milk sugar, one of the dextrin-maltose combinations may be used, especially one of the preparations which contains relatively large amounts of dextrins. . . .

"The net energy value of malt sugar is probably somewhat greater than that of milk sugar and cane sugar because, being converted at once into dextrose, no further change is required."—*P. S. Potter: The metabolism of carbohydrates in infancy, Arch. Pediat. 45:514-526, Sept. 1928.*

1928

"Malt or cane sugar is preferable when there is a well-established intestinal indigestion, in order that fermentation may be reduced."

"Malt sugar, or maltose, is also a disaccharid, breaking up under digestion into two molecules of dextrose. It is more rapidly absorbed than milk sugar and less easily fermented."—*H. B. Wilcox: Infant and Child Feeding, Clinical Pediatrics, D. Appleton & Co., New York, 1928, vol. 12, p. 48.*

1928

"Maltose and Dextrin Compounds can frequently be added to the diet to advantage in the presence of stationary weight, because they can be added to the mixture in quantities approximating one-eighth of an ounce (4 grams) for every pound normal weight, when indicated. It must, however, be remembered that their action on the bowels varies greatly depending upon their maltose, dextrin and alkali content. Thus we find that those of the proprietary foods containing a considerable percentage of dextrin, in the absence of the potassium salt, are constipating (Mead's dextri-maltose No. 1 and No. 2), while those with a higher maltose content . . . are laxative."

"Milk sugar acts as a laxative in many infants. Unless the laxative effect is desirable, it has no advantages.

"Maltose and dextrin compounds are acceptable to the infant's digestion in relatively larger quantities. They are not as sweet as cane sugar. They are of practical value when large amounts of cane or milk are not well taken. Because of their varying maltose, dextrin and alkali content some are constipating and others are laxative."

In athrepsia, "The carbohydrates are usually added in a slowly fermentable form, such as the maltose and dextrin compounds, which are usually started by the addition of four grams per kilogram . . . and increased until eight grams or more per kilogram . . . of body weight are added."—*J. H. Hess: Feeding and the Nutritional Disorders in Infancy and Childhood, F. A. Davis Co., Phila., 1928, pp. 131, 142, 143, 278.*

Continued down to 1934

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